

**Taxonomic and phylogenetic studies  
on Micropsectra Kieffer and other  
Chironomidae (Diptera)**

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Lund 1983**



TAXONOMIC AND PHYLOGENETIC STUDIES ON MICROPSECTRA  
KIEFFER AND OTHER CHIRONOMIDAE (DIPTERA)

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Title and subtitle

Taxonomic and phylogenetic studies on *Microsectra* Kieffer and other Chironomidae (Diptera)

Abstract:

The thesis consists of two different parts. The first is a taxonomic and phylogenetic study of the genus *Microsectra* Kieffer. Genus *Microsectra* is revised (except the *atrofasciata-bidentata*-group) and the phylogenetical relationships studied. Together with the genera *Rheotanytarsus*, *Parapsectra*, *Krenopsectra* and *Paratanytarsus* the genus form a monophyletic group (the *Microsectra* series) within tribe Tanytarsini of the subfamily Chironominae. The phylogenetical value of a number of characters is discussed. The distribution of the *Microsectra* series is discussed and set in relation to the phylogeny. A discussion on the habitat selection is given and the habitat selection is compared to the phylogeny. It is shown that the ancestor of the *Microsectra* series probably was an inhabitant of running water. A list of species previously referred to *Microsectra* is presented and their present status given.

The second part is a study on distribution and phylogenetic significance of male leg sensilla chaetica (Sch). Three different types of Sch were found. One of these seems to be confined to family Chironomidae and was used for the phylogenetical analysis. The study shows that the plesiomorphic taxa possess Sch on the second pair of legs ( $P_2$ ). They have a proximal position on the tarsomere 1. In the more apomorphic taxa Sch are present on  $P_3$  and  $P_2$  or only on  $P_3$ . There is also a tendency for the Sch to move from a proximal towards an apical position during the phylogenesis.

Key words

Diptera, Chironomidae, *Microsectra*, *Rheotanytarsus*, *Parapsectra*, *Krenopsectra*, *Paratanytarsus*, *Chironomus*, taxonomy, morphology, phylogenetic relationships, distribution, sensilla chaetica.

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TAXONOMIC AND PHYLOGENETIC STUDIES ON MICROPSECTRA  
KIEFFER AND OTHER CHIRONOMIDAE (DIPTERA)

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FK, ūg

DISSERTATION

Lund 1983



## ABSTRACT

The thesis consists of two different parts. The first is a taxonomic and phylogenetic study of the genus *Micropsectra* Kieffer. Genus *Micropsectra* is revised (except the *atrofasciata-bidentata*-group) and the phylogenetical relationships studied. Together with the genera *Rheotanytarsus*, *Parapsectra*, *Krenopsectra* and *Paratanytarsus* the genus form a group (the *Micropsectra* series) within tribe Tanytarsini of subfamily Chironominae. The phylogenetical value of a number of characters is discussed. The distribution of the *Micropsectra* series is discussed and set in relation to the phylogeny. A discussion on the habitat selection is given and habitat selection is compared to the phylogeny. It is shown that the ancestor of the *Micropsectra* series probably was an inhabitant of running water. A list of species previously referred to *Micropsectra* is presented and their present status given.

The second part is a study on distribution and phylogenetic significance of male leg sensilla chaetica (SCh). Three different types of SCh were found. One of these seems to be confined to family Chironomidae and was used for the phylogenetical analysis. The study shows that the plesiomorphic taxa possess SCh on the second pair of legs ( $P_2$ ). They have a proximal position on the tarsomere 1. In the more apomorphic taxa SCh are present on  $P_3$  and  $P_2$  or only on  $P_3$ . There is also a tendency for the SCh to move from a proximal towards an apical position during the phylogenesis.



## LIST OF PAPERS

This thesis is based on the papers listed below. They will be referred to by their Roman numerals. The lettering of the references follows Hoffrichter & Reiss (1981 and supplement 2 in preparation).

- I Säwedal, L. In press. Taxonomy, morphology, phylogenetic relationships and distribution of *Microsectra* Kieffer, 1909 (Diptera: Chironomidae). Ent. scand. 13:371-400.
- II Säwedal, L. 1975a. *Microsectra lacustris* n.sp., eine neue Chironomiden-Art (Diptera: Chironomidae) aus Schweden. - Ent. scand. 6: 52-56.
- III Säwedal, L. 1976a. Revision of the *notescens*-group of the genus *Microsectra* Kieffer, 1909 (Diptera: Chironomidae). - Ent. scand. 7: 109-144.
- IV Säwedal, L. 1979a. *Microsectra brundini* n. sp. (Diptera: Chironomidae) and geographical variation in the *Microsectra insignilobus* aggregate. - Ent. scand. Suppl. 10: 133-138.
- V Säwedal, L. & Willassen, E. 1980a. Redescription of *Microsectra borealis* (Kieffer, 1921) n. comb. (Diptera: Chironomidae) - Ent. scand. 11: 56-60.
- VI Säwedal, L. 1981a. Description of *Microsectra tori* n. sp. from Greenland, with notes on the *recurvata*-group (Diptera: Chironomidae). - Ent. scand. 12: 27-30.

- VII Säwedal, L. 1982d. Description of *Nidnurbia* n. gen. with notes on the distribution of *Microsectra* Kieffer (Diptera: Chironomidae). - Ent. scand. 13: 317-320.
- VIII Säwedal, L. 1982a. Distribution of leg sensilla chaetica in male Chironomidae (Diptera) and its phylogenetic significance. - Ent. scand. 13: 1-22.



## INTRODUCTION

This thesis consists of two apparently different parts. The first is the taxonomic and phylogenetic study of the genus *Microsectra* Kieffer that has been published in papers I-VII. The second part is the study on distribution and phylogenetic significance of male leg sensilla chaetica that is presented as paper VIII. There is, however, no contradiction between these two parts. Many phylogenetical analyses have made use of a character within a restricted taxon without studying the phylogenetic trends shown by this character in other related taxa. Paper VIII is an attempt to reach an overall picture of a character in a higher taxon. The results reached by this study have influenced the work carried out on lower taxonomic levels.

Genus *Microsectra* is a member of tribe Tanytarsini in subfamily Chironominae. This subfamily is the most apomorphic within family Chironomidae. *Microsectra* is interesting from many points of view. It is rich in species, about 80 valid species are known, and these are common in a wide variety of habitats. The richness in species and their often very similar morphology causes many taxonomical problems that are of great scientific interest. The occurrence of *Microsectra* in many different habitats and its richness in individuals leads to that it is met in many investigations of limnic habitats in the northern hemisphere. The *Microsectra* species have proved very important in lake monitoring. The lake type referred to as a *Tanytarsus* lake should in fact be better characterized as a *Microsectra* lake.

The general limnological importance of *Microsectra* and the confused taxonomic situation on species level were two of the reasons for revising the genus. Particular weight was laid on rearing and describing

the immature developmental stages. Unfortunately, too few larvae have been reared to permit a taxonomical treatment of this developmental stage. Another important aim of this study was to delimit the genus. This demanded a thorough phylogenetic analysis of *Microsectra* and related genera.

## RESULTS AND CONCLUSIONS OF PAPERS INCLUDED IN THE THESIS

### Taxonomy, morphology, phylogenetic relationships and distribution of *Microsectra* Kieffer, 1909 (I-VII)

Genus *Microsectra* Kieffer, 1909 is described and diagnoses presented for males, females (*notescens*-group), pupae and larvae. *Microsectra* contains at present 83 species of which many constitute synonyms in the *atrofasciata-bidentata*-group. The descriptions for 9 of these species are based on females. The type material for 16 of the species has not been found. A list of 142 species that have been listed under *Microsectra* is presented. The list contains the species names in alphabetical order, the name of the describer, a reference to the description, the genus in which the species was described, the present status of the species, the reference to the paper in which this was listed and the name of the collection in which the type material is deposited. The males of the majority of Palaearctic species, except the *atrofasciata-bidentata*-group that will be treated in a future paper, have been described or redescribed. The females and pupae are described on reared material. The type material of most Nearctic species has been studied.

The taxonomic treatment of *Microsectra* on the species level is complicated due to the presence of morphologically similar species. In one

case the only morphological difference between two species is found in the females. An analysis of the geographical variation of some of the characters (antennal ratio, leg ratio, wing length, length of median volsella) used for separating morphologically similar species is presented. No geographical variation could be demonstrated in these characters. The taxonomy of *Micropsectra* is further complicated due to the presence of many inadequate descriptions and the synonyms caused by these.

The morphological characteristics, evolutionary trends and the phylogenetic relationships of *Micropsectra* are discussed. The genera *Rheotanytarsus*, *Parapsectra*, *Krenopsectra*, *Micropsectra* and *Paratanytarsus* were found to form a monophyletic group. This group is referred to as the *Micropsectra* series.

The genus *Rheotanytarsus* has a worldwide distribution. The genera *Parapsectra* and *Krenopsectra* are only known from the Holarctic Region. The great majority of *Micropsectra* species are found in the Holarctic Region. There is also a smaller number of species that occur in the Oriental Region. Two doubtful species have been reported from India. The *Micropsectra* species reported from South Africa is not a member of this genus. The worldwide distribution of *Rheotanytarsus* indicates a considerable age. It also supports the conclusions of the morphological analysis in which it was found to be the most plesiomorphic genus in the *Micropsectra* series.

The habitat selection in the *Micropsectra* series is compared with the phylogeny. It is found that the plesiomorphic genus *Rheotanytarsus* is confined to streams. The less plesiomorphic genera *Parapsectra* and *Krenopsectra* are found in streams and springs. The species of the more apomorphic genus *Micropsectra* occur in streams and springs but there is also a comparatively high number of species occurring in lakes. The most

apomorphic genus in the *Micropsectra* series, *Paratanytarsus*, contains species that inhabit shallow standing waters. It seems probable that the ancestor of the *Micropsectra* series was an inhabitant of running water. From this primary habitat a radiation towards standing waters occurred. In *Micropsectra* there are species inhabiting small streams and springs as well as species living in lakes. It seems that this genus has a tendency for exploiting a new habitat - the lake. In the apomorphic genus *Paratanytarsus* this trend is even more pronounced and most species are found in shallow standing water. Generally, the plesiomorphic taxa are found in water bodies with a low trophic standard, while the apomorphic taxa inhabit water with a higher trophic standard.

#### Distribution of leg sensilla chaetica in male Chironomidae (Diptera) and its phylogenetic significance (VIII)

The hairlike sense organs that are found on the tarsomeres in Chironomidae can be classified as sensilla chaetica (Sch.) Three different types are described and there are indications on the presence of a fourth type. The most common type of Sch are short, 5-26  $\mu\text{m}$ , and under the light microscope they have a hook-like appearance. SEM reveals that their apical portion is not a single point, but usually split into 8 tips. They are  $< 1 \mu\text{m}$  thick. The surface is smooth, with no visible pores, and there are longitudinal ridges. SEM showed sunken areas in the apical part, suggesting that the cuticle of these areas is thinner. This type of Sch seems to be unique for the Chironomidae. They are present in males of all subfamilies except Aphroteniinae and Telmatogetoninae. Sensillae of this type are found in different parts of the body, but this study has been confined to those on the first tarsomere.



Within the different evolutionary lines two trends are found in the distribution of this type of SCh: (1) In the plesiomorphic taxa SCh are found on  $P_2$  while in the more apomorphic ones they are found on  $P_2$  and  $P_3$  or only on  $P_3$ . (2) The position of the SCh tends to move from a basal position on tarsomere 1 in the plesiomorphic taxa towards a more apical position in the more apomorphic taxa. These two trends are found in several evolutionary lines. The tendency for a parallel development restricts the phylogenetic use of these trends to taxa already delimited by synapomorphies.

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draw from his great knowledge of Chironominae my Tanytarsini studies had been much more difficult to persue.

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# Taxonomy, morphology, phylogenetic relationships and distribution of *Micropsectra* Kieffer, 1909 (Diptera: Chironomidae)

LARS SÄWEDAL

Säwedal, L.: Taxonomy, morphology, phylogenetic relationships and distribution of *Micropsectra* Kieffer, 1909 (Diptera: Chironomidae).  
Ent. scand. 13: 371-400. Lund, Sweden 15 December 1982. ISSN 0013-8711.

Ent. scand.



*Micropsectra* Kieffer, 1909 is described and diagnoses presented for the imaginal (♂♂), pupal and larval stages; females of the *notescens*-group are described. The genus contains at present 83 species of which 9 are described on females. The type material for 16 of these species has not been found. 142 species which have been listed under *Micropsectra* is presented in alphabetical order. This list contains: name of author, reference to description, name of original genus, present status of species, reference to the paper in which this was listed, collection in which the type material is deposited. Morphological characteristics, evolutionary trends and phylogenetic relationships of *Micropsectra* are discussed. The genera *Rheotanytarsus*, *Parapsectra*, *Krenopsectra*, *Micropsectra* and *Paratanytarsus* form a monophyletic group within the tribe Tanytarsini. The group is referred to as the *Micropsectra* series. *Rheotanytarsus*, the most plesiomorphic genus in the series, has a world-wide distribution. This supports the conclusions reached by the morphological analysis. The genera *Parapsectra* and *Krenopsectra* are only known from the Palaearctic and Nearctic Regions.

The great majority of *Micropsectra* species are found in the Palaearctic and Nearctic Regions. A smaller number of species occur in the northern part of the Oriental Region, which has the same environmental conditions as the adjacent areas of the Palaearctic Region. Two doubtful species have been reported from India. Genus *Paratanytarsus* has a wider distribution but clearly has its origin on the northern hemisphere. The habitat selection in the *Micropsectra* series is studied and compared with the phylogeny. The species within the plesiomorphic genera *Rheotanytarsus*, *Parapsectra* and *Krenopsectra* are found in streams and springs. In the more apomorphic genus *Micropsectra* many of the species occur in these types of habitats, though there are also a comparatively high number of species occurring in lakes. *Paratanytarsus*, the most apomorphic genus contains species which inhabit shallow standing waters. It seems probable that the ancestor of the *Micropsectra* series was an inhabitant of running water. A lectotype is designated for *Tanytarsus retusus* Goetghebuer.

Key words: Diptera, Chironomidae. *Micropsectra*, *Rheotanytarsus*, *Paratanytarsus*, *Parapsectra*, *Krenopsectra*, *Tanytarsus*, *Chironomus*, taxonomy, morphology, phylogenetic relationships, distribution.

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## 1. Introduction

The genus *Micropectra* was described as a subgenus of *Tanytarsus* van der Wulp by Kieffer (1909a: 50) who separated it from the other two subgenera, *Tanytarsus* s.str. and *Calopsectra* Kieffer, by means of the pulvilli. He described them as absent in *Tanytarsus* s.str., large in *Calopsectra* and as very small in *Micropectra*. This does not hold, however, and the subgenera are better separated by the male hypopygium and the pupal armature. The larvae, too are clearly different. In fact, *Micropectra* is less closely related to the *Tanytarsus* complex than anticipated by Kieffer.

Three species, *Tanytarsus* (*Micropectra*) *inermipes* Kieffer, *T. (M.) longimanus* Kieffer and *T. (M.) roseiventris* Kieffer, were included in the original generic description in an identification key. Later, the subgenus *Micropectra* was given generic rank by Kieffer (1921a:35), who also designated *M. inermipes* (erroneously spelled *inermis*, repeated 1922g:103 with correct spelling) as type of the genus. Sæwæd (1976a: 120) found that *M. inermipes* was a synonym of *M. notescens* (Walker, 1856b). While Goetghebuer (1928a, 1937-54) regarded *Micropectra* as a genus, Edwards (1929a) considered *Micropectra* a subgenus of *Tanytarsus*.

The immature developmental stages of a *Micropectra* species were first described by Johannsen (1905a) Bause (1913a) after a more thorough study, divided the genus *Tanytarsus* into eight subgroups. What is known as *Micropectra* was referred to as the *inermipes*-group. The more formal taxonomic treatment of these 8 groups was made by Thienemann & Bause (in Bause 1913a: 118-120), unfortunately in a way which resulted in confusion (cfr. Reiss & Sæwæd 1981a:73-74). The *inermipes*-group was referred to subgenus *Eutanytarsus* Thienemann & Bause of genus *Syntanytarsus* Thienemann & Bause. Other members of subgenus *Eutanytarsus* were the *gregarius*-group and the *virens*-group. These groups today form the genus *Tanytarsus*. *Lauterbornia* was listed as an appendage to subgenus *Eutanytarsus*. Later studies on immature stages of *Tanytarsini* have been done by Krüger (1938a, 1941a, 1945a) and Thienemann (1929a, 1951a).

The total number of species group taxa described as *Micropectra* or referred to this genus is 142. At present the genus contains 83 species

of which 9 are described on females. It has not been possible to find the type material for 16 of these species. A list of these nominal species with notes on synonymy and present generic placement is given in section 8.

The present study deals with the imagines, pupae and larvae of *Micropectra*. Unfortunately, very few larvae have been described and the reared material is very meager. In spite of these shortcomings a description of the larvae is presented. It is mainly based on reared material from the *notescens*-group. Only the females of the *notescens*-group are sufficiently well known to permit a description. The *atrofasciata-bidentata*-group need to be analysed in more detail and a revision is under preparation. Similarly, an analysis of part of the type material of Johannsen and Malloch will be published later.

The aims of my *Micropectra* studies (Sæwæd 1975a, 1976a, 1979a, 1981a, 1982b, in press, Sæwæd & Willassen 1980a) have been to revise and describe the species, including their developmental stages, to delimit the genus and to entangle the phylogenetic relationships at the generic level. A study of the intrageneric relationships must wait until more larval, pupal and female material is available.

The group of genera delimited by trends 1 and 2 in section 5 of this paper (*Rheotanytarsus* Thienemann & Bause, *Krenopsectra* Reiss, *Parapsectra* Reiss, *Micropectra* Kieffer and *Paratanytarsus* Thienemann & Bause) will be referred to as the *Micropectra* series.

## 2. Methods and terminology

The mounting procedure of alcohol preserved imagines follows Schlee (1966a), differing mainly in the fact that legs, abdomen and thorax are not dissected. These parts are mounted whole, each under its own cover glass. Further, one of the palps and the halteres are not separated from the head and thorax, respectively. Thus, the location of the body parts is not exactly the same as stated by Schlee (1966a: fig. 1).

Dried imaginal material was placed in a moist box with the bottom covered with filter paper, soaked with water and ethyle acetate. After about 24 hours the specimen was soft and was transferred to 80 % ethanol, before being mounted as described above.



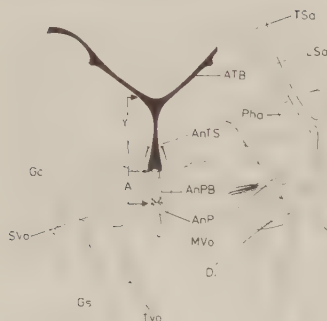


Fig. 1. Schematic drawing of a Tanytarsini hypopygium. Dorsal view. A, length of anal point bars (not present in *Micropsectra*); AnP, anal point; AnPB, anal point bars; AnTS, anal tergal setae (= setae of tergite IX); ATB, anal tergal bands; Di, digitus; Gc, gonocoxite; Gs, gonostyle; IVo, inferior volsella; LSo, lateral sternapodeme; MVo, median volsella; Pha, phallapodeme; SVo, superior volsella; TSa, transverse sternapodeme; Y, length of fused part of anal tergal bands. (From Sæwedal 1981c: fig. 4).

The pupal exuviae have been preserved in 80 % ethanol. The dissection took place in Euparal on the slide after passing through an alcohol series. The cephalothorax was separated from the abdomen which was mounted under coverglasses underlaid by glass splitters. The two halves of the cephalothorax were separated along the dorsomedian suture and mounted in one piece with the lateral sides up.

The methods used for measuring AR and LR are described by Schlee (1966a: fig. 4).

The terminology of the male genitalia follows Sæwedal (1981c: fig. 4, cfr. fig. 1). In earlier papers (Sæwedal 1975a, 1976a, 1979a) the terminology used agreed with Reiss & Fittkau (1971a: fig. 1), as is shown in Fig. 2.

For the terminology of the female genitalia, Sæther (1977c: figs. 15, 70) is followed.

In the present paper the Comstock-Needham system is used for the wing venation with the modifications proposed by Tillyard. The Comstock-Needham system was used in earlier papers (Sæwedal 1975a, 1976a, 1979a, 1981a). The

wing length is measured from the tip to the humeral vein.

The terminology of the pupal cephalothorax follows Sæwedal (1981c:123-124). The terminologies used by Sæwedal 1976a and 1981c are shown in Fig. 3.

The references have been adopted from Fittkau, Reiss & Hoffrichter (1976a) and Hoffrichter & Reiss (1981a).

Museums and collections are indicated by acronyms as listed below:

- ANSP Academy of Natural Sciences of Philadelphia, Philadelphia, USA.
- BMNH British Museum (Natural History), London, England.
- CNC Canadian National Collections, Entomology Research Institute, Ottawa, Ontario, Canada.
- CUI Cornell University, Ithaca, N.Y., USA.
- INS Illinois Natural History Survey, Urbana, Illinois, USA.
- IRSN Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium.
- KUJ Kyushu University, Faculty of Agriculture, Entomology Laboratory, Fukuoka, Japan.
- LUZI Zoologiska Museet, Lunds Universitet, Lund, Sweden.
- MNHN Muséum National d'Histoire Naturelle, Paris, France.
- MNM Magyar Nemzeti Múzeum – Természettudományi Múzeum, Budapest, Hungary.
- NMG Naturhistoriska Museet, Göteborg, Sweden.
- NMW Naturhistorisches Museum, Zoologische Abteilung, Wien, Austria.
- NRS Naturhistoriska Riksmuseum, Stockholm, Sweden.
- ZMC Universitets Zoologiske Museum, Copenhagen, Denmark.
- ZMUH Zoological Museum, University of Helsinki, Helsinki, Finland.
- ZMUO Zoologisk Museum, Universitetet i Oslo, Oslo, Norway.
- ZSM Zoologische Staatssammlung, München, Federal Republic of Germany.

### 3. Description of *Micropsectra* Kieffer, 1909

*Tanytarsus* (*Micropsectra*) Kieffer, 1909a: 50.

*Lauterbornia* Kieffer, 1911b: 42. N. syn.

*Micropsectra* Kieffer, 1909a. Erected to genus and type species designated by Kieffer (1921a:35). Type species: *Tanytarsus* (*Micropsectra*) *inermis* (*inermis* err.) Kieffer, 1909a:50.

*Eutanytarsus* Thienemann & Bause, in Bause 1913a: 120; Kieffer 1921a:35.

*Syntanytarsus* Thienemann & Bause, in Bause 1913a:120; Kieffer 1921a:35.

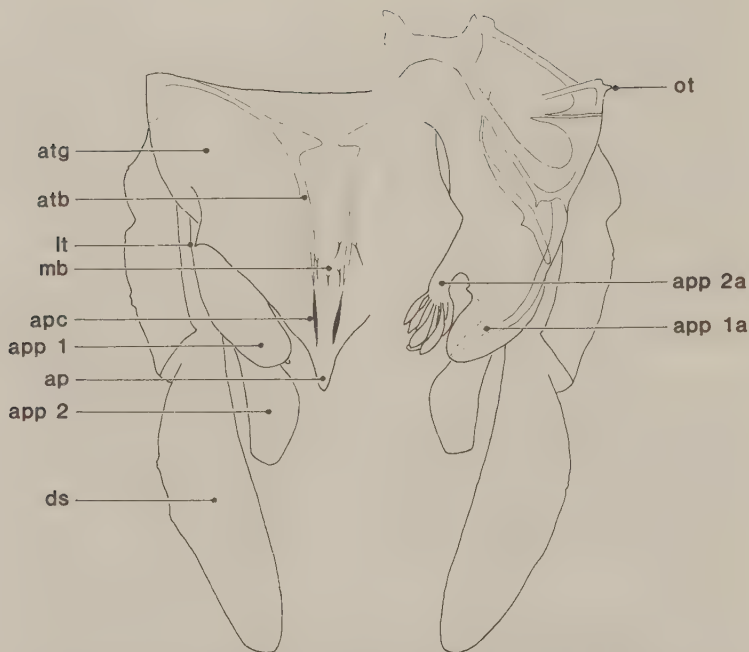


Fig. 2. Schematic drawing of a *Micropsectra* hypopygium. Dorsal view. ap, anal point; apc, anal point crests; app 1-2a, appendages of the hypopygium; atb, anal tergal band; atg, anal tergite; ds, dististylus; lt, lateral tooth; mb, median bristles; ot, oral-lateral tooth. (From Sæwædal 1976a: fig. 1).

*Lundstroemia* Kieffer, 1921a:36; Reiss 1974b:207.

Type species: *Tanytarsus*

(*Micropsectra*) *roseiventris* Kieffer, 1909a: 50.

? *Goetghebueria* Kieffer, 1921b:79.

? *Natvigia* Kieffer, 1922b:7.

*Oeklandia* Kieffer, 1922b:6-7; Sæwædal & Willassen 1980a: 57. Type species:

*Oeklandia borealis* Kieffer, 1922b:6-7 by monotypy.

*Eutanytarsus* Thienemann & Bause, in Bause 1913a:120 partim; Kieffer 1922g: 103.

? *Himatendipes* Tokunaga, 1959a:21-23; Sæwædal & Willassen 1980a:57.

**Diagnostic characters:** The male *Micropsectra* differs from male of *Paratanytarsus* in the shape of the anal point crests, which are as long as broad and form a

rounded structure in *Paratanytarsus*, while they usually are longer than broad, parallel or converging, and never form a rounded structure in *Micropsectra*. At present no reliable diagnostic character for separating male *Micropsectra* from male *Parapsectra* and *Krenopsectra* can be given. In the two known *Krenopsectra* species, *K. acuta* and *K. fallax*, the median volsellae increase in width towards apex. This may be a diagnostic character for separating these genera. Male *Micropsectra* differs from male *Rheotanytarsus* by having the lamellar setae of median volsellae separate and not more or less fused into a plate. The majority of *Rheotanytarsus* species possess a gonostyle that suddenly narrows distally. No diagnostic character can be presented for the females due to lack of adequate material. The *Micropsectra* pupae differ from all other chironomids in having the combination of an elongated

field of longer spinules on posteriomedian part of tergite III and one pair of transversely elongated fields of short spinules on each of tergites IV and V. The larvae of *Micropspectra*, *Krenopspectra* and *Parapspectra* differ from all other Tanytarsini genera by the combination of small Lauterborn organs on a very long pedicell and bifid premandibles. *Parapspectra* (only larva of *P. uliginosa* known) differ from *Micropspectra* and *Krenopspectra* by outer margin of mandible with distinct hump (Pinder in litt.). The larva of *Krenopspectra* (only larva of *K. fallax* known) differ from *Parapspectra* and the known European species of *Micropspectra* having a dorsal hump on abdominal segment XI. In the North American species *M. dives* a hump is present but this species also possesses an antennal pedestal with spur.

### Description

#### 3.1. Males

Small to medium-sized. Wing length 1.3–4.5 mm. The colour varies from green to completely black.

**Head.** Eyes with (*M. tuberosa* Reiss) or without pubescence. Never with hairs. Antennal flagellum with 13 flagelleomeres. AR = 0.5–2.72. Frontal tubercles present, small to large. Eyes with dorsal projection. Palps with 4 segments.

**Thorax** without mesonotal hump. Acrostichals long and bent in posterior direction, in 1–2 rows. Dorsocentrals usually in 1, but in some species in 2 rows, in some species beginning at anteprepronotum, in others beginning between anteprepronotum and scutellum. Prealar 2–4. Scutellars in one row. Supraalar absent.

**Wings** well developed. Most species with macrotrichia on distal 3/4 of wing membrane. Veins with macrotrichia to varying degree.

Venation clearly discernable. C not projecting beyond R 4+5. R 2+3 ends half way between R 1 and R 4+5. FCu under or distal of RM. An ends under or slightly distal of FCu. Stout false veins along M 3+4 and Cu 1. Weak false veins along An and the distal part of M 1+2.

**Legs.** Front tibia without or with a short spur. Tibial combs of  $P_{II}$  and  $P_{III}$  fused or narrowly separated, usually by the width of 1 spinule, and covering about 1/2 to 3/4 of circumference of tibia. Comb without spurs or the larger comb with 1 of the spinules enlarged and sometimes forming a long straight spur. Pulvilli absent. Only  $Ta_1$  of  $P_{II}$  with at most 20 sensilla chaeticae on the apical part.

**Hypopygium:** Anal tergite in nearly all species

with lateral teeth. Bands of anal tergite always separated, in some species forming a medially directed projection (Säwedald 1976a: fig. 8). Median setae of anal tergite always present and forming one group. Anal point and paired anal point crests always present. Anal point long and tapering towards the pointed apex (Säwedald 1976a: fig. 10) or long with nearly parallel margins (Reiss 1969c: figs. 9, 11) and in some species with apical part notched (l.c.: fig. 11). Anal point crests long and converging in posterior direction or long and nearly parallel, in some species very high, in others very low.

**Superior volsella** elongated (Reiss 1969c: fig. 3) or finger-shaped (Säwedald 1976a: fig. 10) with 2–3 setae at tip and pointing in median direction or rounded with setae at median margin (Pinder 1976b: fig. 1). Dorsal part of volsella with a field of setae. In many species a lateral to ventrolateral field of microtrichia on volsella. In most species another field of microtrichia at base of volsella. Size of field varying from very small to large. Between bases of superior- and median volsellae a long seta sitting on a tubercle ("Micropspectra-seta").

**Digitus** varying from absent to very long and then reaching far beyond margin of superior volsella.

**Median volsella** varies from short to very long, on distal part with lamellar setae of varying shape: spoon-shaped, branched, simple, foliate, spatulate and angulate (cfr. Reiss 1968b: fig. 25).

**Inferior volsella** long and tube-shaped, often with a transverse ridge (Säwedald 1976a: fig. 24) or long with a ball-shaped swelling at tip (l.c.: fig. 10) or long with a pistill-like shape (Reiss 1971a: fig. 1) or long and strongly bent at apex (l.c.: fig. 2) or long and s-shaped (Reiss 1969c: fig. 3).

**Apodemes** uniform throughout the genus (cfr. Säwedald 1975a: fig. 2. Säwedald 1976a: figs. 2, 8, 10).

#### 3.2. Females (*notescens*-group)

Small to medium-sized. Wing length 2.31–3.25 mm. Colour similar to ♂

**Head.** Eyes without pubescence, never with hairs with dorsal projection. Antennal flagellum with 6 flagellomeres, the first and second are fused together. Flagellomeres with a low number of setae, nos. 2–5 with a few sensilla chaetica on the thin distal part, and no. 6 with numerous

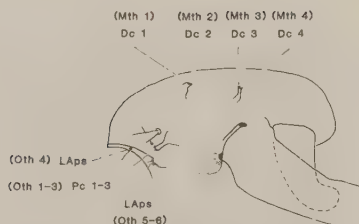


Fig. 3. Thorax of *Micropsectra* pupa. Lateral view. Abbreviation within brackets refers to term use by Sæwæd 1976a. Terms used in this paper and in Sæwæd 1981c without brackets. Dc, dorsocentral seta; LAp, lateral anteprenotal seta; Mth, metathoracic hair; Oth, oral thoracic hair; Pc, precorneal seta.

sensilla chaeticae. Frontal tubercles present or absent. Palps with 4 segments.

**Thorax** without mesonotal hump. Acrostichals reach anteprenotum. Dorsocentrals reach anteprenotum. Prelarals 1-5. Scutellars in 1 row.

**Wings** well developed, more densely covered with macrotrichia than in male. Wing shorter and broader in female than in male, but venation similar.

**Legs.** Claws and tibial combs as in male. Ta 1 with 19-68 sensilla chaetica on distal part.

**Genitalia:** Postgenital plate triangular in ventral view. Covered with microtrichia which in some species point anteriorly and in others posteriorly. Cerci 95-151  $\mu$ m long. 2 suboval spermathecae present. Gonapophysis VIII clearly divided into a dorsomesal and a ventrolateral lobe. Dorsomesal lobe round or weakly triangular, at base with a group of differentiated setae. Ventrolateral lobe of varying shape, along median margin with a fringe of setae which become longer anteriorly. Floor under anterior part of vagina always present but of varying size. Notum long, about 4.6-8.4  $\times$  longer than ramus, in most species consisting of 2 structural elements which are fused together. In *M. insignilobus* only 1 structural element can be observed.

### 3.3. Pupae

**Cephalothorax** with long frontal setae inserted on small to well developed frontal tubercles. Thoracic horn always present, 220-930  $\mu$ m long, tube-shaped and with long setae (Sæwæd 1976a; fig. 12). Base of thoracic horn inserted on a ball-

shaped structure. In *M. coracina* the thoracic horn easily falls off and only the ball-shaped structure can be observed in most specimens (cfr. Bause 1913a; fig. 102). Cephalothorax without hump near thoracic suture. In front of wing sheaths with the usual wart or with a tubular structure (Sæwæd 1976a; figs. 13, 14). Pearl rows absent. Wing sheaths usually with a nose in dorsal position on posterior part. Wing and leg sheath arrangements (Fig. 4) corresponds to type 7, the *Tanypus* type of Brundin (1966a; fig. 631).

**Thorax** (cfr. Fig. 3): Chaetotaxy. On both sides 3 precorneals ( $PC_{1-3}$ ) and 3 lateral anteprenotals ( $LAP_{1-3}$ ).  $PC_{1-3}$  are situated in front of and slightly ventral of the thoracic horn.  $LAP_1$  is in median part of prothoracic region.  $LAP_{2-3}$  are close together at basis of  $P_3$  sheaths. 4 dorsocentrals ( $DC_{1-4}$ ) in 2 groups widely separated from each other. Their longitudinal position varies slightly between the species groups.

**Abdomen:** Tergites I and II without fields of spinules. Tergite II with a row of anteriorly bent hooks on posterior margin. Pedes spurii B on the same segment. Tergite III with 2 fields of spinules in posteriomedian part, posteriorly the fields usually become broader and the spinules longer. Tergite IV with 2 transverse, elongated fields of short spinules on anterior part (Sæwæd 1976a; figs. 14-16). In some species a lateral row of longer spinules posterior of the elongated fields (Reiss 1965b; figs. 7a-b). Tergite V similar to tergite IV. In *M. attenuata* and *M. bodanica* the transverse fields of tergites IV and V are very weakly developed. Tergite VI with 2 median and longitudinal stripes of shagreenation. Tergite VII similar to tergite VI or more common shagreenation is lacking. Tergite VIII with 2 fields of shagreenation on anterior part. Caudolateral combs of segment VIII with 3-8 spines. Anal lobe with about 20-90 filamentous setae on each half. Setae arranged in single or multiple rows.

Chaetotaxy of abdomen:

|        | I | II | III | IV | V | VI | VII | VIII | IX |
|--------|---|----|-----|----|---|----|-----|------|----|
| D      | 3 | 5  | 5   | 5  | 5 | 5  | 5   | 1    | 1  |
| L + LS | - | 3  | 3   | 3  | 3 | 4  | 4   | 5    | -  |
| V      | - | 4  | 4   | 4  | 4 | 4  | 4   | 1-2  | -  |

O-setae on tergites and sternites II-VIII.

### 3.4 Larvae

Small to medium-sized, up to 10 mm long. Tu-



Fig. 4. Wing and leg sheath arrangements of *Micropsectra* pupa. Lateral view.

be building. Living specimens reddish, after preservation in ethanol yellowish white.

**Head:** Clypeus and frons divided by a sharp suture (cfr. Reiss 1969b: fig. 4). Labral sclerites 1 and 2 well separated. SI 1 and SI 2 each with a pair of simple setae (S 1 and S 2). At suture between SI 1 and SI 2 a pair of setae (S 3).

**Labrum:** 4 setae labrales (S I–IV) present. S I long, comb-shaped and bent in median direction. Bases of the S I setae fused. S II simple or weakly plumose, sitting on long protrusions. S III thin and simple. S IV short and sitting on short protrusion. Pecten epipharyngis consists of 3 scales that distally split up in number of finger-shaped protrusions. Labral lamella consists of 2 parts with short rounded teeth. Premandible distally bifid, lateral tooth thin and pointed, median tooth broader, longer or of similar length as lateral tooth.

**Antenna** 5 segmented. Well developed pedicel without or more often with a median spur of varying size. Segment 1 long, cylindrical and slightly curved, on basal part with ring organ, on median part with a short seta, and distally with slender blade. Segment 2 longer than remaining segments. Lauterborn organs small, opposite and on very long pedicell.

**Mandible** with 5 brown teeth. Seta interna consists of about 4 branches which distally are strongly split up. 2 long and thin setae externa present. Seta subdentalis long. Pecten mandibularis long, consisting of 8–16 lamellae.

**Mentum** with simple and usually notched median tooth. 5 lateral teeth on each side of median tooth. Ventromental plates strongly elongated, nearly meeting medially. Striation on anterior 1/3–1/2 of ventromental plates.

**Abdomen:** Segment XI with a dorsomedian hump (in *M. dives*) or without hump. (cfr. Reiss 1969b: fig. 9). Procerci well developed with a number of setae. 2 pairs of anal tubules present. Posterior parapods with numerous, simple claws which are arranged in multiple rows.

#### 4. Morphological characteristics and evolutionary trends

##### *Dorsal hump on abdominal tergite XI of larva*

Johannsen (1905a:288–290) described the species *Tanytarsus dives* which was transferred to *Micropsectra* by Sublette & Sublette (1965a: 178). According to the original description (Johannsen 1905a: 288, pl. 26, fig. 5) the larva possesses a dorsal hump on segment XII. This false observation was later corrected (Johannsen 1937b: 13) to segment XI. The second species in the *Micropsectra* series with a dorsal hump was reported by Reiss (1969b: fig. 9), viz. *Krenopsectra fallax*.

Outside the *Micropsectra* series a dorsal hump on the penultimate abdominal segment is found in the Chironomini genus *Lauterborniella* Thienemann & Bause.



The presence of this structure in taxa which are taxonomically widely separated from each other indicates that it is possible for a fairly complex structure to develop independently in different evolutionary lines.

#### *Tubular structure of pupal cephalothorax*

The presence of a tubular structure in front of the wing sheaths was first reported by Reiss (1969c: 436, fig. 5) from *Micropsectra attenuata*. Its presence in the closely related species *M. bodanica* was not mentioned. The same structure was later discovered (Säwedal 1976a: 133, fig. 25) in *M. junci* and in *Paratanytarsus dimorphus* by Reiss & Säwedal (1981a: 93). Säwedal (1981c: 130, fig. 8) reported its presence in *Caladomyia spixi*.

The shape of the tubular structure is either thin and very long (Säwedal 1981c: fig. 8), short with broadly rounded apex (Säwedal 1976a: fig. 25) or short and strongly tapering towards apex (Reiss 1969c: fig. 5). The function of this organ is not known.

The tubular structure occurs in taxonomically widely separated taxa. This makes an interpretation of its phylogenetical significance difficult. It is, however, a valuable taxonomic character on the species level. It enabled the separation (Säwedal 1976a: 111) of pupal *M. junci* from pupal *M. nesciens*. Reiss & Säwedal (1981a: 93–94) used the structure to separate pupal *Paratanytarsus dimorphus* from pupal *P. natvigii*. It is possible that its presence in *Caladomyia* is restricted to *C. spixi*.

#### *Thoracic horn of pupa*

The thoracic horn in the *Micropsectra* series is an elongated sack-shaped organ. The connection between this and the pupal cephalothorax is a short, ball-shaped structure. In *M. coracina* the thoracic horn often breaks between these parts (Bause 1913a: fig. 102). Most *Rheotanytarsus* species carry short spinules on distal half of the thoracic horn, more seldom it is nude. In many tropical and one Palaearctic species, the thoracic horn is strongly bent in its median part (Bause 1913a: fig. 81). The thoracic horn in *Krenopsectra*, *Parapsectra* (except for *P. uliginosa*), *Micropsectra* and some *Paratanytarsus* with long spinules (cfr. Reiss 1969b: figs. 2, 3. Säwe-

dal 1976a: figs. 7, 12). In *Parapsectra uliginosa* the spinules are completely reduced (Reiss 1969a: fig. 8). The conditions are more complex in *Paratanytarsus* where the thoracic horn is either nude; have long spinules as described above; is ball-shaped at base with distal part thinner and apically split up in 2–3 small tips; or have basal half with short and broad spines and distal half smooth.

The pattern evolved in the *Micropsectra* series is interesting. It indicates that the plesiomorphic state of character is a thoracic horn with short spinules on distal part or smooth (*Rheotanytarsus*). The following step is a thoracic horn with long spinules (*Krenopsectra*, most *Parapsectra*, *Micropsectra* and some *Paratanytarsus*). The occurrence of several types (cfr. above) in *Paratanytarsus* indicates that reductions take place within this genus. The shape of the thoracic horn has not been used for constructing the cladogram presented in Fig. 7. For solving the phylogenetic relationships within *Paratanytarsus* an analysis of the thoracic horn shapes may prove valuable.

#### *Lateral setae of pupal abdomen*

The setae on the margins of the pupal abdomen may be develop as simple lateral setae or as lateral filamentous setae, while transitional

Table 1. Number of lateral setae in Tanytarsini pupae. Roman letters indicate segment number.

|                           | I | II | III | IV | V   | VI | VII | VIII |
|---------------------------|---|----|-----|----|-----|----|-----|------|
| <i>Stempellinella</i>     | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 4    |
| <i>Stempellina</i>        | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 3–4  |
| <i>Constempellina</i>     | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 2    |
| <i>Tanytarsus</i>         | 0 | 3  | 3   | 3  | 3   | 3  | 3   | 5    |
|                           | 0 | 3  | 3   | 3  | 3   | 3  | 4   | 5    |
|                           | 0 | 3  | 3   | 3  | 3   | 3  | 4   | 4    |
|                           | ? | ?  | 2   | 2  | 2   | 2  | 4   | 5    |
|                           | ? | ?  | 2   | 2  | 3   | 3  | 4   | 4    |
| <i>Camposimya</i>         | 0 | 3  | 3   | 4  | 4   | 4  | 4   | 4    |
| <i>Cladotanytarsus</i>    | 0 | 3  | 3   | 3  | 3   | 3  | 4   | 5    |
| <i>Nimbocera</i>          | 0 | 3  | 3   | 3  | 3   | 3  | 3   | 4    |
| <i>Neozavrelia</i>        | ? | 2  | 2   | 2  | 2   | 2  | 2   | 2    |
| <i>Rheotanytarsus</i>     | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 5    |
|                           | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 4?   |
| <i>Krenopsectra acuta</i> | 0 | 3  | 3   | 3  | 3   | 3  | 4   | 4    |
| <i>K. fallax</i>          | 0 | 3  | 3   | 3  | 3   | 3  | 4   | 5    |
| <i>Parapsectra nana</i>   | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 4    |
| <i>P. uliginosa</i>       | 0 | 3  | 3   | 3  | 3   | 3  | 3   | 4    |
| <i>P. styriaca</i>        | 0 | 3  | 3   | 3  | 3–4 | 4  | 4   | 4    |
| <i>Micropsectra</i>       | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 5    |
| <i>Paratanytarsus</i>     | 0 | 3  | 3   | 3  | 3   | 4  | 4   | 5    |

forms exist. In the *Micropsectra* series the lateral filamentous setae may also be found on segments IV–VIII. Both types are called lateral setae in this paper. The number of lateral setae on the margins of the segments is shown in Tab. 1.

The lateral setae of the Tanypodinae pupal abdomen were discussed by Fittkau (1962a: 52–54, 71, 73). He found that the pupa of this hypothetical plesiomorphic Tanypodinae species should possess 6–8 lateral setae on each margin of the segment. The plesiomorphic state of character in Podonominae has been found to be 3 lateral setae on each margin of segment I, 4 on segment II–VII and 5 on segment VIII (Brundin 1966a: 86–92). The setal arrangements in the Podonominae species *Podochlus* sp. "Nireco" indicate that 5 setae on segments III–VIII might be the plesiomorphic state.

From Tab. 1 it can be seen that *Rheotanytarsus*, *Parapsectra* (except *P. uliginosa*), *Micropsectra* and *Paratanytarsus* have 4 lateral setae on segment VI, while *Krenopsectra* and *Parapsectra uliginosa* have 3. The latter is the apomorphic state of character.

Segment VII carries 4 lateral setae in *Rheotanytarsus*, *Krenopsectra*, *Parapsectra* (except *P. uliginosa*), *Micropsectra* and *Paratanytarsus*. In *P. uliginosa* the number is found to be 3 which should be considered the apomorphic state.

Segment VIII have 5 lateral setae in *Rheotanytarsus*, *Krenopsectra fallax*, *Micropsectra* and *Paratanytarsus*. The apomorphic state, 4 setae occurs in *Parapsectra* and *Krenopsectra acuta*.

Considering at least 5 setae on the margins of all segments to be the plesiomorphic state of character it is evident from the pattern found in various taxa that the reduction in the number of setae started in the anterior segments and progressed backwards.

The mosaic pattern found in the genera *Krenopsectra* and *Parapsectra* is interesting and it should be noted that these genera were defined by plesiomorphic characters. It may show that the number of setae on the segments are of importance for delimiting monophyletic taxa within the *Micropsectra* series.

The number of lateral setae is remarkably constant within the taxa. A variation in the number of lateral setae within a species has been found only in *M. borealis* and *P. styriaca*. In *M. borealis* the variation is found in all segments, also between the two margins of the same seg-

Table 2. Number of setae on one half of tergite IX in pupae of the *Micropsectra* series.

|                           |                |
|---------------------------|----------------|
| <i>Stempellinella</i>     | 0              |
| <i>Stempellina</i>        | 0              |
| <i>Constempellina</i>     | 0              |
| <i>Thienemanniola</i>     | 0              |
| <i>Tanytarsus</i>         | 2              |
| <i>Camposimyia</i>        | 1              |
| <i>Cladotanytarsus</i>    | 2              |
| <i>Nimbocera</i>          | 2, sometimes 3 |
| <i>Neozavrelia</i>        | 2              |
| <i>Rheotanytarsus</i>     | 0 or 1         |
| <i>Krenopsectra acuta</i> | 1              |
| <i>K. fallax</i>          | 2              |
| <i>Parapsectra nana</i>   | 2              |
| <i>P. uliginosa</i>       | 2              |
| <i>P. styriaca</i>        | 1              |
| <i>Micropsectra</i>       | 1              |
| <i>Paratanytarsus</i>     | 1              |

ment. The variational pattern of *P. styriaca* is not known to me.

#### Setae on tergite IX of pupa

The number of setae on one half of tergite IX in some of the Tanytarsini genera is shown in Tab. 2. Brundin (1966a: tab. 1) concluded that the plesiomorphic Podonominae pupa lacks setae on tergite IX. Within the Tanytarsini absence of dorsal setae on tergite IX was used as a synapomorphy for the genera *Stempellinella*, *Stempellina*, *Constempellina* and *Thienemanniola* by Sæther (1977c: fig. 62). In the *Micropsectra* series there exists no clear trend in the distribution of these setae. Genus *Rheotanytarsus* has 0 or 1 seta. It should be noted that at least the European species which have a dorsal seta lack the sudden narrowing of the male gonostyle. Such a gonostyle is probably apomorphic. This could indicate that the setae on tergite IX tend to be reduced during the evolution. *Krenopsectra fallax*, *Parapsectra nana* and *P. uliginosa* have each 2 dorsal setae, while *K. acuta*, *P. styriaca*, *Micropsectra* and *Paratanytarsus* have 1 dorsal seta each. This may also be an indication that the number of setae tend to be reduced.

#### Dorsal armature of pupa

Anterior part of tergite II in the genus *Rheotanytarsus* and the species *Parapsectra styriaca* with 2 oval or transversely elongated fields of short spinules (cfr. Lehmann 1970b: fig. 23). These fields are missing in *Parapsectra* (except

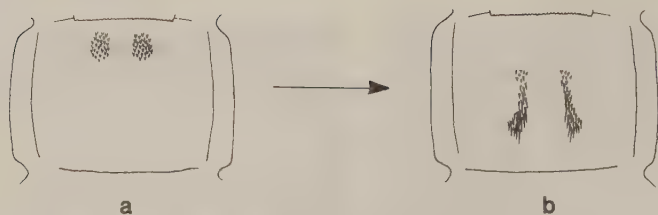


Fig. 5. Dorsal armature of tergite III in pupa. a, *Rheotanytarsus*. b, *Micropsectra*.

for *P. styriaca*), *Krenopsectra*, *Micropsectra* and *Paratanytarsus*. Outside this group of taxa similar types of oval fields of short spinules on tergite II are found in *Cladotanytarsus* and *Neozavrelia*.

The anterior part of tergite III has 2 fields of spinules in *Rheotanytarsus*, *Parapsectra* and *Krenopsectra*. The fields of spinules are situated on median or posterior part of tergite III in all *Micropsectra* and in most *Paratanytarsus* (Fig. 5). The fields are absent in a number of *Paratanytarsus* species (cf. Reiss & Sawedal 1981a: figs. 4, 25) which, however, clearly belong to this taxon. The significance of these patterns will be discussed below. A similar, but not identical, structure on median or posterior part of tergite III is found in taxa grouped around *Tanytarsus*. The way in which the dorsal armature of tergite III is developed in *Micropsectra* and *Paratanytarsus* constitute the apomorphic state of character.

Two transverse, more or less elongated fields of spinules on the anterior part of tergite IV are present only in *Micropsectra*. The fields are weakly developed in *M. attenuata* and *M. bodanica* but their shape agrees with that found in other *Micropsectra* species. A pair of transverse elongated fields of short spinules is also found in *Rheotanytarsus nigricauda*. In the other *Rheotanytarsus* species the fields are oval and arranged longitudinally. The fields have a straight to concave anterior margin and a convex posterior margin in *Parapsectra*. They are about as broad as long (Reiss 1969a: fig. 9). In *Krenopsectra* the fields are weakly developed (Reiss 1969b: fig. 11) and the individual spinules are surrounded by shagreenation. The fields in *Paratanytarsus* are U-shaped, round or separated

(Reiss & Sawedal 1981a: figs. 22–31). In many *Micropsectra* and *Paratanytarsus* species there are 2 longitudinally orientated fields of longer spinules on the tergite (Reiss 1965b: fig. 7b. Reiss & Sawedal 1981a: figs. 4, 22, 27, 29). These fields are situated posteriorly or posterolaterad of the fields of short spinules. It is possible that these longitudinal fields are phylogenetically important. They appear to occur only in taxa belonging to tribe Tanytarsini. Their phylogenetic significance has not been investigated for the present paper.

Fields of short spinules on tergite V are similar to those on tergite IV. Tergite VI has fields of short spinules similar to those on tergite IV and V or the fields are absent. The remaining tergites carry only shagreenation.

The patterns formed by the fields of short spinules on the pupal abdomen are valuable means for finding evolutionary trends. The evolutionary steps for genera of the *Micropsectra* series are shown in Fig. 6. Two oval or rounded fields of short spinules on the anterior part of tergites II–IV, II–V, II–VI or III–VI are found in the genera *Rheotanytarsus*, *Parapsectra* and *Krenopsectra*. Similar patterns are also found in *Cladotanytarsus*, *Neozavrelia* and *Corynocera*. These genera are grouped around *Tanytarsus*. The presence of similar structures in two different evolutionary lines indicates either a parallel development or a plesiomorphic state of character. The genera in the *Micropsectra* series which possess these types of dorsal armature are as regards other characters the most plesiomorphic in the series. Therefore, the presence of these types of dorsal armature can be regarded as a plesiomorphy.

The next evolutionary step is that the fields of

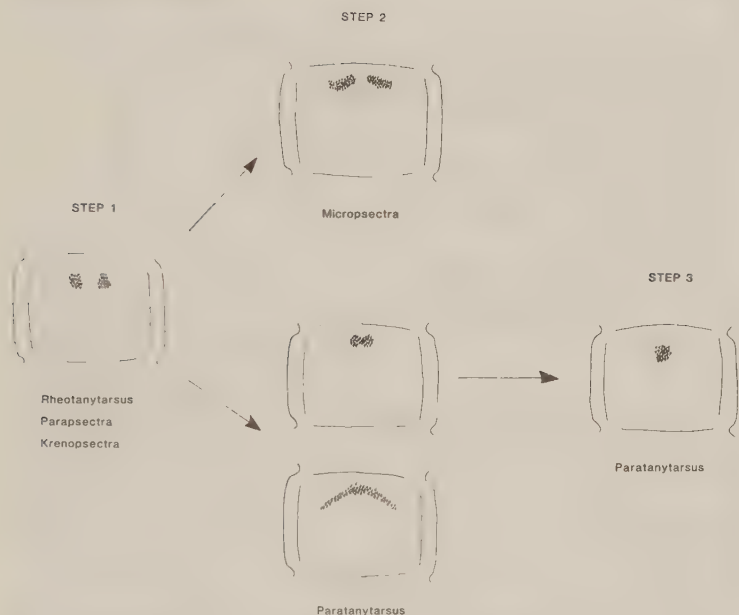


Fig. 6. Steps in the evolution of the pupal dorsal armature on tergite IV in the *Micropsectra* series.

short spinules on the anterior part of tergites II and III are reduced. This state of character is found in *Micropsectra* and *Paratanytarsus*. The majority of species in these taxa develop elongated, longitudinal fields of spinules on the median or posterior part of tergite III. The fields usually become broader and the spinules longer posteriorly (Reiss & Säwedel 1981a: fig. 22). The fields are absent in some *Paratanytarsus* species. (l.c.: figs. 24, 25). The evolutionary significance of this modification of the spine fields has not been studied.

The evolution of tergite IV within these genera follows two different paths. In *Micropsectra* the field on tergite IV become more or less elongated and transverse to the longitudinal axis. In *Paratanytarsus* the trend is that the fields move towards the median line where they fuse into one

field which can be round (l.c.: fig. 30) and more seldom U-shaped (l.c.: fig. 23). In some species the round fields are narrowest on the median part (l.c.: fig. 25) which may indicate the fusion of two fields into one. The presence of U-shaped fields may be due to the same principle. The elongated, U-shaped fields are always broadest on the median part (l.c.: figs. 23, 24). I have used the shape of these fields on tergites IV and V as an autapomorphy for *Micropsectra* in comparison with *Paratanytarsus*. The fusion of fields which is observed in *Paratanytarsus* does not take place in all species and therefore constitutes no autapomorphy for the genus.

The evolutionary trends within the *Micropsectra* series are summarized in the following sentences:

- 1) Reduction of the fields of spinules on tergite

II (*Krenopsectra*, *Parapsectra* except for *P. styriaca*, *Micropsectra*, *Paratanytarsus*).

2) Reduction of the fields of spinules on tergite III (*Micropsectra*, *Paratanytarsus*) and the development of longitudinal fields of spinule, i.e. a new structure (*Micropsectra*, the majority of *Paratanytarsus* species).

3) Development of transverse, elongated fields of spinules on tergites IV and V (*Micropsectra*).

4) Fusion of the fields of spinules on median margin of tergite IV and often also on tergite V (in many *Paratanytarsus*).

5) Development of rows of longer spinules posteriorly or posteriolaterad of the fields of short spinules on tergite IV and often also on tergite V (in many *Micropsectra* species, in many *Paratanytarsus* species).

#### Middle and hind tibial combs of imago

In *Rheotanytarsus* the middle and hind tibial combs are usually widely separated and one or both carry a long spur. Combs on  $< 0.5 \times$  the circumference of tibia (cfr. Lehmann 1970b: fig. 22). This state is also found in the genera grouped around *Tanytarsus* and is the plesiomorphic state of characters. In the other genera of the *Micropsectra* series the middle and hind tibial combs are fused and without spurs or narrowly separated and with or without short spur. The combs on  $\geq 0.5 \times$  the circumference of tibia. This state appears to be confined to these taxa and can be regarded as the apomorphic state of character.

*Parapsectra uliginosa* differs by widely separated middle and hind tibial combs which lack spurs. The teeth of the combs are narrowly separated from each other and there is a clear tendency for spacing of the teeth (Reiss 1970a: 197, fig. 4a). The reason may be due to the peculiar way of living which has resulted in brachypterous males and macropterous females.

#### Gonapophysis VIII of female

The division of gonapophysis VIII (Gp VIII) into a dorsomesal and a ventrolateral lobe is discussed by Sæther (1977c: 131), who regarded the capacity for division of Gp VIII as a synapomorphy uniting the subfamilies Diamesinae, Prodiamesinae, Orthocladiinae and Chironominae. The division of Gp VIII into two lobes was found to

Table 3. Length of notum divided with length of ramus in some Tanytarsini females.

|                                  |     |
|----------------------------------|-----|
| <i>Stempellinella</i> sp.        | 0.9 |
| <i>Stempellinella</i> sp.        | 1.1 |
| <i>Tanytarsus</i> sp.            | 1.9 |
| <i>Cladotanytarsus</i> sp.       | 1.2 |
| <i>Rheotanytarsus nigricauda</i> | 4.7 |
| <i>Rheotanytarsus</i> sp.        | 3.6 |
| <i>Micropsectra notescens</i>    | 5.6 |
| <i>M. lindrothi</i>              | 5.6 |
| <i>M. contracta</i>              | 8.4 |
| <i>M. apposita</i>               | 4.6 |
| <i>M. aristata</i>               | 4.6 |
| <i>Paratanytarsus</i> sp.        | 4.8 |

take place in different ways. In Orthocladiinae, the ventrolateral lobe is the principal one, while in Chironominae the dorsomesal lobe constitutes the main lobe. In Tanytarsini the divided Gp VIII is regarded as a synapomorphy for the genera *Rheotanytarsus*, *Krenopsectra*, *Parapsectra*, *Micropsectra* and *Paratanytarsus* (Sæther 1977c: 137). In the cladogram presented by Sæther (l.c. fig. 62) genus *Nimbocera* is included in this group of genera by mistake which is clear from his description of female *Nimbocera* (l.c. p. 145). The information about the synonymizing (l.c. p. 145) of *Lundstroemia* Kieffer with *Paratanytarsus* is not correct. Reiss (1974b: 205) synonymized the former genus with *Micropsectra*. In *Rheotanytarsus* the two species *R. nigricauda* and *Rheotanytarsus* sp. were studied. The former is a plesiomorphic member of the genus, a fact that strengthens the phylogenetic value of the division of Gp VIII. In the remaining genera females of numerous species have been studied and all have a divided Gp VIII.

#### Notum and ramus of female

A long notum has been found to be an apomorphic state of character (Sæther 1977c: 137). It is a synapomorphy for genera *Rheotanytarsus*, *Krenopsectra*, *Parapsectra*, *Micropsectra* and *Paratanytarsus*. Sæther included *Krenopsectra* in this group of genera in spite of the fact that females of this genus are unknown. On the other hand all other evidences indicate that it belongs to this group of genera. Sæther compared the length of notum with the length of the seminal capsule. In the present study the length of notum divided by the length of ramus is used. Length of



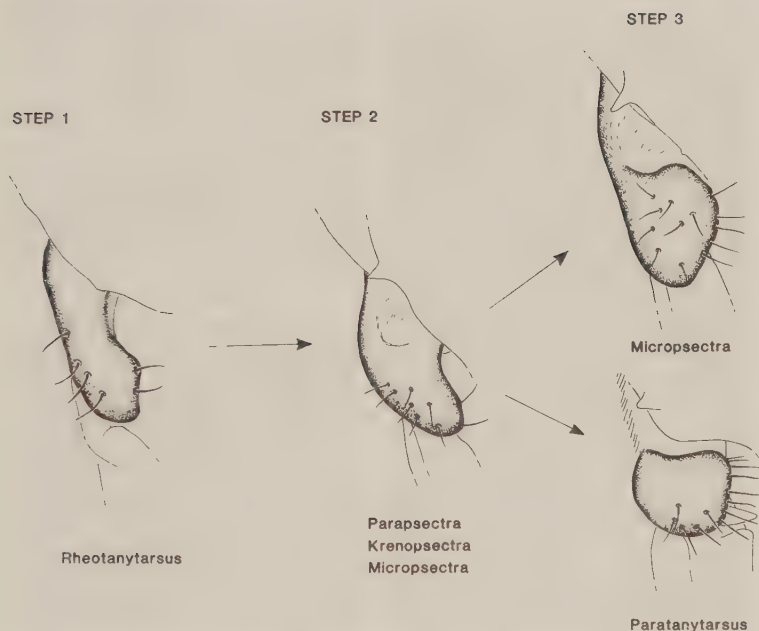


Fig. 7. Possible steps in the evolution of the superior volsella in the *Micropsectra* series.

notum and length of ramus are coupled characters and the use of their ratio instead of the direct length neutralizes the influence of inter- and intraspecific size variations. There is a great gap in this value (Tab. 3) between genera grouped around *Tanytarsus* and those grouped around *Micropsectra*. This underlines the importance of this character.

#### *Superior volsella of male*

Possible steps in the evolution of the superior volsella are shown in Fig. 7. The plesiomorphic shape of the superior volsella is a straight, longitudinal sack-shaped structure often carrying a hook-shaped process. The volsella bears 2 setae on median part of median margin. Near the me-

dian part, the dorsal surface has a number of longitudinally arranged setae which point in lateral or posterolateral direction. This type of superior volsella is found in most *Rheotanytarsus* species. In at least one species, *R. globosus* Reiss, the superior volsella is transverse to median line, broadly elliptic and with setae at tip. In the next evolutionary step, which is found in many *Micropsectra* species and all species belonging to *Parapsectra* and *Krenopsectra*, the superior volsella is bent in a median direction and usually has a finger-shaped form. The volsella carries 2 or 3 setae at the tip and a higher number of setae on the dorsal surface. The dorsal setae point in a posterolateral to posterior direction. In the third evolutionary step the superior volsellae are rounded. This third step has

been realized in *Micropsectra* and *Paratanytarsus*.

An important factor when evaluating these trends is the position of the median and the dorsal setae on the superior volsella. The setae on the dorsal surface of the superior volsella are directed in lateral or posterolateral direction in *Rheotanytarsus*. They are directed in posterior or posterolateral direction in *Krenopsectra*, *Parapsectra* and *Micropsectra* except in the *atrofasciata-bidentata*-group. Their direction is often slightly different depending on which seta that is examined. The setae close to apex of superior volsella are usually directed posteriorly, while those more distant from apex have a posterolateral direction. The species within in *atrofasciata-bidentata*-group that possesses the most weakly rounded superior volsella is *M. bidentata*. In this species the dorsal setae point in the following directions when examined from front to rear: anterolateral, lateral, posterolateral, posterior and posteromedian. In *M.atrofasciata*, with a much more rounded superior volsella, the directions are: lateral, posterolateral, mediolateral and anteromedian. These differences support the assumption that the trend in the evolution of the superior volsella proceeds from a straight volsella with laterally directed dorsal setae towards a rounded volsella with setae pointing in many directions.

In *Paratanytarsus*, where nearly all species have a rounded superior volsella, the dorsal setae display a slightly different pattern. In these species the directional variations are much smaller and the setae point in almost the same direction, varying as in *Micropsectra*. The *Paratanytarsus* pattern may indicate that the process for obtaining a rounded superior volsella has followed a slightly different course in this genus.

## 5. Phyletic relations

A comprehensive phylogenetic study of the tribe Tanytarsini was presented by Sæther (1977c). His analysis was mainly based on female structures with the addition of selected characters of males, pupae and larvae. The analysis did not reach the genus level in the *Micropsectra* series. The present results differ only slightly from those obtained by Sæther.

The only attempt so far to solve the phylogeny of the species within a Tanytarsini genus was

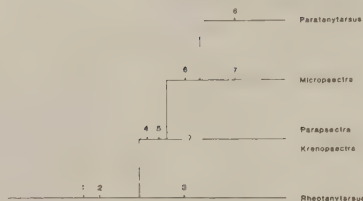


Fig. 8. Cladogram illustrating the phylogenetic relationships within the *Micropsectra* series. The Arabic figures refer to the trends discussed in section 5. A bar indicates the change of a character to an apomorphic state.

made by Reiss (1968d), who analyzed the phylogenetic pattern within the genus *Neozavrelia* Goetghebuer.

A drawback with many phylogenetic studies is that structures are dealt with only where they are of immediate importance, e.g. for a cladogram. It is, however, valuable to know how these structures are developed in other taxa. Therefore I have collected such information in tables, thus facilitating discussions on parallelisms, convergences and homologies. Another phenomenon which is often encountered in phylogenetic studies is the extensive use of reductions as the apomorphic state of character. In the present paper this has been avoided as far as possible.

The phylogenetic relationships on species level within *Micropsectra* has turned out to be very difficult to assess. The mosaic patterns found in the development of many characters make it difficult to find synapomorphies that are unambiguous. It is often relatively easy to find a synapomorphy for a group of species but to find its sister group has in many cases been impossible. These difficulties may be due to a shift of habitat and the resulting change of selective pressure. This phenomenon is widespread and the principles lying behind deserve closer studies. Discussions on these problems, based on whirligig beetles, were presented by Brinck (1978, 1980, 1981).

The phylogenetic relationships of *Micropsectra* and the taxa related to this genus are shown tentatively in Fig. 8, presented in a cladogram. The following abbreviations are used: a = apomorphic, p = plesiomorphic.

- Trend 1 — Gonapophysis VIII clearly divided into a ventrolateral and a dorsomesal lobe (a) or undivided (p). (cfr. p. ■).
- Trend 2 — Notum long (about 3.5–7.0× as long as ramus) (a) distinctly shorter (p). (cfr. p. ■).
- Trend 3 — Lamellar setae of median volsella fused into a plate or with a clear tendency for doing so (a). Lamellar setae of median volsella separate (p). (cfr. p.).
- Trend 4 — Superior volsella more or less fingershaped with medially directed setae at tip or rounded (a). Superior volsella straight with setae on median part of median margin and parallel to longitudinal axis or broadly elliptic and transverse to longitudinal axis with setae at tip (p).
- Trend 5 — Middle and hind tibial combs fused and without spurs or narrowly separated and with or without short spur. Combs on  $\geq 0.5\times$  the circumference of tibia (a). Middle and hind tibial combs usually widely separated, one or both carrying a long spur. Combs on  $< 0.5\times$  the circumference of tibia (p). (cfr. p.).
- Trend 6 — Tergite III of pupa with two fields of spinules in median or posteromedian part of tergite, posteriorly the fields often become broader and the spinules longer or the two fields of spinules are lacking (a). Tergite III of pupa with two fields of spinules on anterior one half (p). (cfr. p.).
- Trend 7 — Tergites IV and V of pupa in anterior part with elongated, transverse fields of short spinules (a). Tergites IV and V of pupa in anterior part with two rounded fields, one more or less rounded median field or a U-shaped field of short spinules (p). (cfr. p.).
- Trend 8 — Anal point crests of male as long as broad (Reiss & Sæwæd 1981a: figs. 1, 5–21) and forming a rounded structure (a). Anal point crests of male usually longer than broad, parallel or converging (Sæwæd 1976a: figs. 2, 8, 9, 35–37) (p). (cfr. p.).

## 6. Distribution

The general distribution of most Tanytarsini genera is shown in Tab. 4. *Cladotanytarsus*, *Tanytarsus*, *Rheotanytarsus* and *Stempellina* have a worldwide distribution, which may indicate a considerable age. A thorough analysis of these genera may demonstrate the presence of a vicariance pattern between intragenetic groups. For

example, the Neotropical *Stempellina* species were found to form a separate taxonomic group (Sæwæd, in press). Six of the listed genera are only known from the Palaearctic region. Genera *Camposia* and *Nimbocera* are only known from the Neotropical region, monotypic genus *Nidnurbia* only from the Afrotropical region and genus *Himatendipes* only from the Oriental region. The latter constitutes probably a junior synonym of *Micropsectra* (Sæwæd & Willassen 1980: 59). Interesting distributional patterns are found in *Pontomyia* and *Sublettea* (cfr. Tab. 4).

The taxa which are most relevant for the present study, *Rheotanytarsus*, *Krenopsectra*, *Parapsectra*, *Micropsectra* and *Paratanytarsus* show different distributional patterns. *Krenopsectra* and *Parapsectra* occur in the Palaearctic and the Nearctic regions. *Paratanytarsus* is known from the Palaearctic, Nearctic, Neotropical (the Central Mexican Highland), Afrotropical and Australian regions. Most of the *Paratanytarsus* species are found in the Northern hemisphere and it is probable that the genus has its origin there (Reiss & Sæwæd 1981:74). The occurrence of the genus on the southern hemisphere must then be due to secondary dispersal. The great majority of *Micropsectra* species are found in the Nearctic and the Palaearctic region. A smaller number of species are reported from Nepal in the northern part of the Oriental region (Reiss 1968c, 1971a). The environmental conditions in this part of the Oriental region do not differ from those found in the adjacent areas of the Palaearctic region. There are also two doubtful *Micropsectra* species, *M. indicus* (Kieffer) and *M. confundendus* (Kieffer) which were described on material from Calcutta and Port Canning in W Bengal, respectively. The former species was described from the female sex only, the latter one from a male and originally placed in the genus *Tanytarsus* but was transferred to *Micropsectra* by Sublette & Sublette (1973b: 416). There exists no modern description of this species. The two parthenogenetic species of *Lundstroemia* (= *Micropsectra*) which have been reported from Australia do not belong to *Micropsectra*. The published drawings of the pupae reveal that they are members of *Paratanytarsus*. The South African species described as a *Micropsectra* by Freeman (1955d) is not a member of this genus (Sæwæd 1982d); the new monotypic genus *Nidnurbia* has been erected for

Table 4. Distribution of Tanytarsini genera.

|                        | Palearctic | Nearctic | Oriental | Afrotropical | Australian | Neotropical | Unpublished<br>(F. Reiss pers.<br>comm.)             |
|------------------------|------------|----------|----------|--------------|------------|-------------|------------------------------------------------------|
| <i>Stempellinella</i>  | ×          | 0        | +        |              |            |             | 0 W Canada<br>+ SW China                             |
| <i>Zavrelia</i>        | ×          | ×        | ×        | ×            |            |             |                                                      |
| <i>Stempellina</i>     | ×          | ×        | ×        | ×            | ×          | ×           |                                                      |
| <i>Constempellina</i>  | ×          |          |          |              |            |             |                                                      |
| <i>Thienemanniola</i>  | ×          |          |          |              |            |             |                                                      |
| <i>Tanytarsus</i>      | ×          | ×        | ×        | ×            | ×          | ×           |                                                      |
| <i>Sublettea</i>       |            | ×        | 0        |              |            |             | 0 SW China, N India<br>See Pinder in press           |
| <i>Virgatanytarsus</i> | ×          |          |          | ×            |            |             |                                                      |
| <i>Lithotanytarsus</i> | ×          |          |          |              |            |             |                                                      |
| <i>Nimbocera</i>       |            |          |          |              |            | ×           |                                                      |
| <i>Neozavrelia</i>     | ×          |          | 0        |              |            |             | 0 SW China                                           |
| <i>Caladomyia</i>      |            | ×        |          |              |            | ×           |                                                      |
| <i>Corynocera</i>      | ×          | ×        |          |              |            |             |                                                      |
| <i>Pontomyia</i>       |            |          |          |              | ×          | 0           | 0 Belize, Central<br>America                         |
| <i>Camposimyia</i>     |            |          |          |              |            | ×           |                                                      |
| <i>Cladotanytarsus</i> | ×          | ×        | ×        | ×            | ×          | ×           |                                                      |
| <i>Lenziella</i>       | ×          |          |          |              |            |             |                                                      |
| <i>Nidnurbia</i>       |            |          |          | ×            |            |             |                                                      |
| <i>Rheotanytarsus</i>  | ×          | ×        | ×        | ×            | ×          | ×           |                                                      |
| <i>Parapsectra</i>     | ×          | 0        |          |              |            |             | 0 Maine, USA prope<br>nana plus a second<br>species. |
| <i>Krenopsectra</i>    | ×          | 0        |          |              |            |             | 0 W Canada                                           |
| <i>Himatendipes</i>    |            |          | ×        |              |            |             |                                                      |
| <i>Micropsectra</i>    | ×          | ×        | ×        |              |            |             |                                                      |
| <i>Goetghebueria</i>   | ×          |          |          |              |            |             |                                                      |
| <i>Paratanytarsus</i>  | ×          | ×        | ×        |              | ×          | ×           |                                                      |

this species. The four Hawaiian species referred to *Micropsectra* by Hardy (1960a) do not belong there. Except for Greenland, there are no reliable reports of *Micropsectra* species common to both the Palearctic and the Nearctic regions. The Palearctic species *M. lindrothi*, *M. groenlandica*, *M. recurvata* and an undescribed species closely related to *M. groenlandica* occur also on Greenland. If Greenland is the western limit remains open until a revision of the Nearctic Tanytarsini is published. The report by Oliver (1963a) on the occurrence of *M. insignilobus* on Ellesmere Island was published before this taxon was divided into three species. A possible case of geographical vicariance may be present in the species pair *M. repentina* and a still undescribed species. The former was described on material from Nepal, while the latter occurs in Central

Europe from where it has been reported under the nomen nudum *M. pharetrophora*.

A comparison of the cladogram (Fig. 7) with the generic distributions within the *Micropsectra* series is instructive. It demonstrates that the most plesiomorphic genus of this series (*Rheotanytarsus*) has a worldwide distribution, while the other, more apomorphic genera, have their distribution centered to the Holarctic region. A worldwide distribution is an indication of considerable age, while a restricted distribution may be due to a more recent provenance. The presence, within an evolutionary line, of a worldwide distribution in the most plesiomorphic taxon and a more restricted distribution in more apomorphic taxa supports the results of the morphological analysis.

Table 5. Habitat selection of *Micropsectra* species. P = profundal zone; L = litoral zone; × = □□.

|                        | Streams |                                  |                 | Springs   |            |             | Lakes     |           |             |              |            |                   |
|------------------------|---------|----------------------------------|-----------------|-----------|------------|-------------|-----------|-----------|-------------|--------------|------------|-------------------|
|                        | Potamal | Lentic places in epirithral zone | Epirithral zone | "Streams" | Helocrenic | Limnocrenic | "Springs" | Eutrophic | Mesotrophic | Oligotrophic | Oligohumic | Ultraoligotrophic |
| <i>M. lindebergi</i>   |         |                                  |                 |           |            |             |           |           |             | P            | P          | P                 |
| <i>M. insignilobus</i> |         |                                  |                 |           |            |             |           |           |             | P            | P          | P                 |
| <i>M. lindrothi</i>    |         |                                  | ×               |           | ×          | ×           |           |           |             |              |            |                   |
| <i>M. notescens</i>    |         | ×                                |                 |           |            |             | ×         |           |             |              |            |                   |
| <i>M. contracta</i>    |         |                                  |                 |           |            |             |           |           | P           | P            |            |                   |
| <i>M. apposita</i>     |         | ×                                |                 |           |            |             |           |           |             |              |            |                   |
| <i>M. junci</i>        |         | ×                                |                 |           | ×          |             |           |           |             |              |            |                   |
| <i>M. lacustris</i>    |         |                                  |                 |           |            |             |           |           |             |              | P          |                   |
| <i>M. recurvata</i>    |         | ×                                |                 |           | ×          |             |           |           |             |              |            |                   |
| <i>M. borealis</i>     |         |                                  |                 |           |            |             |           |           |             |              |            | L                 |
| <i>M. aristata</i>     |         | ?                                |                 |           |            |             |           |           |             |              |            |                   |
| <i>M. attenuata</i>    |         | ×                                |                 |           |            |             |           |           |             |              |            |                   |
| <i>M. bodanica</i>     |         | ×                                |                 |           |            |             |           |           |             |              |            |                   |
| <i>M. coracina</i>     |         |                                  |                 |           |            |             |           |           |             | L + P        |            |                   |
| <i>M. roseiventris</i> |         |                                  |                 |           | ×          |             |           |           |             |              |            |                   |
| <i>M. atrofasciata</i> | ×       |                                  | ×               |           |            |             |           |           |             |              |            |                   |
| <i>M. bidentata</i>    |         | ×                                |                 |           |            |             |           |           |             |              |            |                   |
| <i>M. groenlandica</i> |         |                                  |                 |           |            |             |           |           |             | L + P        |            |                   |
| <i>M. ygghdrasili</i>  |         |                                  |                 | ×         |            |             |           |           |             |              |            |                   |

## 7. Habitat selection

The broad outline of the habitat selection of the *Micropsectra* species is shown in Tab. 5. Most species occur in springs and streams. Species inhabiting streams prefer lentic places in the

epirithral zone. 7 of the listed species occur in lakes. The trophic level of the lakes where they occur is low and can be classified as ultraoligotrophic, oligotrophic, oligohumic or moderately mesotrophic. Two of the species, *M. lindebergi* and *M. insignilobus*, are known only from the



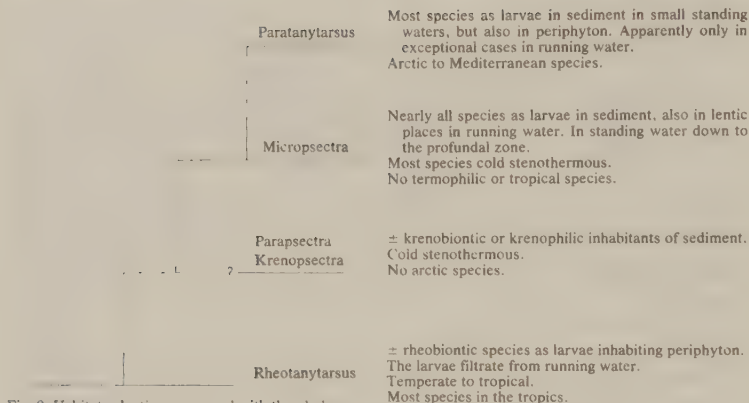


Fig. 9. Habitat selection compared with the phylogeny of the *Micropsectra* series.

profundal zone, while *M. coracina* and *M. groenlandica* occur also in the littoral zone. *M. borealis* has been found in the littoral zone of ultraoligotrophic lakes in the arctic region. The vertical occurrence of *M. lacustris* larvae is not known. The morphologically very similar species *M. lindebergi* and *M. insignilobus* have been found under sympatric and synchronous conditions. Our knowledge of their habit selection is poor and does not allow any conclusions regarding similarities and dissimilarities in their occurrence. It is interesting that two other pairs of morphologically similar species show a different pattern. *M. contracta* and *M. apposita* occur in the profundal zone of oligotrophic to mesotrophic lakes and in lentic places in the epirithral zone of streams, respectively. The other species pair, *M. groenlandica* and the still undescribed *M. yggdrasil*, has a similar pattern. The former species occurs in the littoral and profundal zones of oligotrophic lakes, while the latter species occurs in streaming waters. Another interesting phenomenon is demonstrated by *M. groenlandica*. In the subarctic lakes of Sweden this species is one of the more common chironomids. It is found in the profundal zone as well as the littoral zone (Brundin 1949a: 787). In Central Europe the species has only been found in the

profundal zone (Reiss 1968b: 274). It is possible that additional studies may alter this pattern as was the case with *M. coracina*. This species was believed to inhabit the littoral zone of oligotrophic subarctic lakes and the profundal zone of Central European lakes. Reiss (1968b: 272) reported the larvae also from the sublittoral zone of Lake Constance.

It is tempting to speculate on the evolution of habitat selection within the *Micropsectra* series. The species of *Rheotanytarsus*, the most plesiomorphic genus within this series (Fig. 9), are confined to streaming waters. In *Krenopsectra*, the species *K. fallax* is a cold stenothermic inhabitant of springs and streams. The larvae belong to the moss-fauna. The other species, *K. acuta*, has been reared from *Lithotanytarsus* tuff in a stream (Reiss 1969b: 440–441). The habitat has been adequately described for two of the *Parapsectra* species, while it is poorly known for the others. *P. nana* occurs (Reiss 1969a: 194) in lentic places in streams from springs. The larvae of *P. uliginosa* have been found in small standing waters in bogs at high altitude and in lentic places of small streams, close to the spring. The habitats of both species are influenced by subsoil water and they can be described as cold stenothermic. The larvae and pupae of the *Paratany-*

*tarsus* species inhabit shallow standing waters such as tarns, ponds and the littoral zone of lakes. They are found in sediments and at plant covered places. Species stenotopically restricted to the profundal zone of lakes are not known. Some species occur in oligo- and mesohaline waters. Species stenotopically bound to running waters and springs as well as halobiontic species are not known. Many species can, however, be found in springs and small streams.

A comparison of this review of habitat selection with the cladogram for the *Micropsectra* series (Fig. 8) reveals an interesting pattern. The species in the plesiomorphic genera *Rheotanytarsus*, *Krenopsectra*, and *Parapsectra* are found in streams and springs. In the more apomorphic genus *Micropsectra* many of the species occur in these types of habitats, though there are also a comparatively high number of species in lakes. *Paratanytarsus*, the most apomorphic genus of the *Micropsectra* series, contains species that inhabit shallow standing waters. It seems probable that the ancestor of the *Micropsectra* series was an inhabitant of running water. From this primary habitat a radiation towards standing waters occurs. The pattern of habitat selection in *Micropsectra* is instructive. In this genus there are species inhabiting small streams and springs as well as species living in

lakes. It seems that, within this genus, there is a tendency for exploiting a new habitat—the lake. In the apomorphic genus *Paratanytarsus* this trend is even more pronounced and most species are found in shallow standing water. Generally, the plesiomorphic taxa are found in water bodies with a low trophic standard, while the apomorphic taxa inhabit water with a higher trophic standard. An apomorphic habitat selection is displayed by *Paratanytarsus tenellulus*. The larvae of this species are found on floating plant debris at the water's surface in shallow eutrophic pools and this indicates that it may be a member of a discrete habitat in floating vegetable debris (Säwedäl & Langton 1977a: 170). The properties of this type of habitat, the kinal, were discussed by Fittkau (1977a).

## 8. List of species

The following list contains, in alphabetical order, all species known to me which at one time or another were listed under *Micropsectra*. The left column gives: name of author, reference to original description and, within parenthesis, the original genus. The right column gives: present status of species and reference to actual paper and name of the collection where the type material is kept (cfr. Chapt. 2).

- |                                                                                        |                                                                          |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <i>acuta</i> Goetghebuer, 1934f:350<br>( <i>Micropsectra</i> )                         | = <i>Krenopsectra acuta</i> (Goetghebuer)<br>(Reiss 1969b:441). — IRSN   |
| <i>affectus</i> (Walker) sensu Goetghebuer 1928a: 117                                  | = (cfr. p. ■■■).                                                         |
| <i>andalusiaca</i> Marcuzzi, 1950a:274<br>( <i>Micropsectra</i> )                      | = A species in the <i>atrofasciata-bidentata</i> -group. — NMW           |
| <i>angorensis</i> Kieffer, 1918b:117<br>( <i>Micropsectra</i> )                        | = Described on ♀.<br>(cfr. p. ■■■).                                      |
| <i>appendiculata</i> Brundin<br>( <i>Micropsectra</i> )                                | = A nomen nudum.                                                         |
| <i>appositus</i> Walker, 1856b:191<br>( <i>Chironomus</i> )                            | = <i>Micropsectra appositus</i> (Walker).<br>(Säwedäl 1976a:128). — BMNH |
| <i>aristata</i> Pinder, 1976b:275–280<br>( <i>Micropsectra</i> )                       | = <i>Micropsectra aristata</i> Pinder.<br>BMNH                           |
| <i>atrofasciatus</i> Kieffer, 1911b:59<br>( <i>Tanytarsus</i> ( <i>Micropsectra</i> )) | = <i>Micropsectraatrofasciata</i> (Kieffer).<br>IRSN                     |
| <i>attenuata</i> Reiss, 1969c:432–439<br>( <i>Micropsectra</i> )                       | = <i>Micropsectra attenuata</i> Reiss.<br>ZSM                            |
| <i>auvergnensis</i> Reiss, 1969c:442–444<br>( <i>Micropsectra</i> )                    | = <i>Micropsectra auvergnensis</i> Reiss<br>ZSM                          |
| <i>barbatimanus</i> Kieffer 1922g:104–105<br>( <i>Micropsectra</i> )                   | = Type material not found.                                               |
| <i>bavarica</i> Thienemann<br>( <i>Gowiniella</i> )                                    | = A nomen nudum.                                                         |
| <i>bidentatus</i> Goetghebuer, 1921a:172<br>( <i>Tanytarsus</i> )                      | = <i>Micropsectra bidentata</i> (Goetghebuer).<br>IRSN                   |

- bifilis* Kieffer, 1922g:125  
(*Tanytarsus*)
- bipunctinatus* Goetghebuer, 1933c:211  
(*Tanytarsus*)
- bodanica* Reiss, 1969c:439-442  
(*Micropsectra*)
- borealis* Kieffer, 1922b:6-7  
(*Oeklandia*)
- brevimanus* Kieffer, 1916:502-503  
in: Thienemann & Kieffer 1916a.  
(*Syntanytarsus* (*Eutanytarsus*))
- brundini* Sæweda, 1979a:134-138  
(*Micropsectra*)
- brunneus* Walker, 1848a:21  
(*Chironomus*)
- brunnipes* Zetterstedt, 1850a: 3518-3519  
(*Chironomus*)
- campestris* Meigen, ?
- capicola* Freeman, 1955d:379-380  
(*Micropsectra*)
- chionophilus* Edwards, 1933a:90  
(*Tanytarsus* (*Micropsectra*))
- clastrieri* Reiss, 1969c:444-446  
(*Micropsectra*)
- confinis* Walker, 1848a:15-16  
(*Chironomus*)
- confundendus* Kieffer, 1911f:169  
(*Tanytarsus*)
- connexus* Kieffer, 1906c:17  
(*Chironomus*)
- contracta* Reiss, 1965b:228-234  
(*Micropsectra*)
- coracinus* Zetterstedt, 1850a: 3508-3509  
(*Chironomus*)
- coracina* Kieffer, 1911b:42  
(*Lauterbornia*)
- curtimanus* Kieffer, 1924f:84-85  
(*Micropsectra*)
- curvicornis* Chernovskii, 1949a:48  
(*Micropsectra*)
- daisenensis* Tokunaga, 1938a:364-367  
(*Tanytarsus* (*Micropsectra*))
- deflectus* Johannsen, 1905a:288  
(*Tanytarsus*)
- dentatilibus* Kieffer, 1925b:224-225  
(*Micropsectra*)
- desecta* Reiss, 1971a:138-139  
(*Micropsectra*)
- dicerus* Kieffer, 1922g:126  
(*Tanytarsus*)
- digitata* Reiss, 1971a:132-134  
(*Micropsectra*)
- dives* Johannsen, 1905a:288-289  
(*Tanytarsus*)
- dubius* Malloch, 1915a:496  
(*Tanytarsus*)
- effectus* Walker
- = *Micropsectra notescens* (Walker).  
(Sæweda 1976a:120). — IRSN
- = *Micropsectra atrofasciata* (Kieffer).  
(Reiss & Fittkau 1971a:82). — IRSN
- = *Micropsectra bodanica* Reiss.  
ZSM
- = *Micropsectra borealis* (Kieffer).  
(Sæweda & Willans 1980). — ZMUO
- = Described on ♀. (cfr. p. ■■■).
- = *Micropsectra brundini* Sæweda.  
ZSM
- = (cfr. p. ■■■x).
- = *Micropsectra junci* (Meigen).  
(Sæweda 1976a:131). — LUZI
- = (cfr. p. ■■■).
- = *Nidurbia capicola* (Freeman).  
(Sæweda 1982d). — LUZI
- = *Parapsectra chionophila* (Edwards).  
(Reiss 1971c:79). — BMNH
- = *Micropsectra clastrieri* Reiss.  
ZSM
- = (cfr. p. ■■■)
- BMNH
- = *Micropsectra confundendus* (Kieffer).  
(Sublette & Sublette 1973b:416). — Not revised!  
Type material not found.
- = (cfr. p. ■■■).
- = *Micropsectra contracta* Reiss.  
ZSM
- = (cfr. p. ■■■).
- LUZI
- = *Micropsectra coracina* (Kieffer).  
(Reiss 1974b:205). (cfr. p. ■■■.) — IRSN
- = Type material not found.
- = Described on larva. Present status not known.
- = *Micropsectra daisenensis* (Tokunaga)  
Type material not found.  
According to Tokunaga (pers. comm.) it was deposited in KUJ.
- = Described on ♂♀ and pupa. The latter was so damaged that no description of the abdomen was presented. The thoracic horn is very specific (Johannsen 1905a: pl. 22, fig. 6). — Type material probably in CUI.
- = *Micropsectra apposita* (Walker).  
(Sæweda 1976a:128). — IRSN
- = *Micropsectra desecta* Reiss.  
CNC
- = Described on ♀. The species is a *Micropsectra* according to Thienemann (1929a:101). — Location of type material unknown.
- = *Micropsectra digitata* Reiss.  
CNC
- = *Micropsectra dives* (Johannsen).  
(Sublette & Sublette 1965a). (cfr. p. ■■■). — CUI
- = *Paratanytarsus dubius* (Malloch). N. comb.  
(cfr. p. ■■■). — INS
- = (cfr. p. ■■■).

- excisus* Kieffer, 1911b:56-57  
(*Tanytarsus* (*Tanytarsus*))  
*exsectus* Kieffer, 1911b:58  
(*Tanytarsus* (?))  
*fatigans* Johannsen, 1905a:292  
(*Tanytarsus*)  
*flavofasciatus* Kieffer, 1911b:47-48  
(*Tanytarsus* (*Calopsectra*))  
*foliata* Laville, 1965a:73-81  
(*Micropsectra*)
- fossarum* Tokunaga, 1938a:362  
(*Tanytarsus* (*Micropsectra*))  
*franzii* Goetghebuer, 1949a:7  
(*Micropsectra*)  
*freyi* Störå, 1945a:31  
(*Micropsectra*)
- fuscus* Meigen, 1804a:18  
(*Ch. ironomus*)  
*globulifer* Goetghebuer, 1921a:123  
(*Tanytarsus*)  
*gmundensis* Egger, 1863a:1109  
(*Chironomus*)  
*gmundensis* var. *subviridis* Goetghebuer, 1921a:124  
(*Tanytarsus*)  
*gracilentus* Holmgren, 1880a:181  
(*Chironomus*)  
*groenlandica* Andersen, 1937a:34-36  
(*Micropsectra*)  
*hemipilus* Kieffer, 1911b:51-52  
(*Tanytarsus* (*Tanytarsus*))  
*heptameris* Kieffer, 1925b:226  
(*Micropsectra*)  
*hortensis* Kieffer, in Bause 1913a:52  
(*Tanytarsus*)  
*hydra* Kieffer, 1913e:197  
(*Tanytarsus*)
- imicola* Kieffer, 1913a:28  
(*Tanytarsus*)  
*indicus* Kieffer, 1910b:242  
(*Tanytarsus* (*Micropsectra*))  
*inermipes* Kieffer, 1909a:50  
(*Tanytarsus* (*Micropsectra*))  
*insignilobus* Kieffer, 1924f:85-86  
(*Micropsectra*)  
*insularis* Kieffer, 1911b:50  
(*Tanytarsus* (*Calopsectra*))  
*integrilobus* Kieffer, 1924f:186  
(*Micropsectra*)  
*intrudens* Walker, 1856b:179  
(*Chironomus*)  
*janetscheki* Reiss, 1971a:134-135  
(*Micropsectra*)  
*junci* Meigen, 1818a:50  
(*Chironomus*)  
*lacustris* Sæwedal, 1975a:52-56  
(*Micropsectra*)  
*laetipes* Zetterstedt, 1850a:3587-3588  
(*Chironomus*)  
*lanceolatus* Kieffer, 1911b:59  
*latifrons* Kieffer, 1925b:225  
(*Micropsectra*)
- = Type material not found.
- = Type material not found.
- = Described on ♀.  
Type material probably kept in CUI.
- = *Micropsectra junci* (Meigen).  
(Sæwedal 1976a:138). — IRSN
- = *Micropsectra lindrothi* Goetghebuer.  
(Sæwedal 1976a:116) — Coll. H. Laville, Lab. de Zoologie, Toulouse, France.
- = *Micropsectra fossarum* (Tokunaga).  
Type material not found (Sæwedal 1976a:109).
- = *Micropsectra franzi* Goetghebuer.  
A species in the *atrofasciata-bidentata*-group. IRSN
- = *Micropsectra freyi* Störå.  
A species in the *atrofasciata-bidentata*-group. ZMUH
- = *Micropsectra fusca* (Meigen).  
(cfr. p. ■■■). — MNHN
- = *Micropsectra globulifera* (Goetghebuer).  
A species in the *atrofasciata-bidentata*-group. IRSN
- = *Micropsectra junci* (Meigen).  
(Sæwedal 1976a:131). — NMW
- = *Micropsectra junci* (Meigen).  
(Sæwedal 1976a:138). — IRSN
- = (cfr. p. ■■■).
- = *Micropsectra groenlandica* Andersen.  
ZMC
- = *Micropsectra notescens* (Walker).  
(Sæwedal 1976a:120). — IRSN
- = Type material not found.
- = Type material not found.
- = Described on a ♀.  
(cfr. p. ■■■). — Location of type material not known.
- = Type material not found.
- = Described on a ♀.
- = *Micropsectra notescens* (Walker).  
(Sæwedal 1976a:120). — IRSN
- = *Micropsectra insignilobus* Kieffer.  
(Sæwedal 1976a:139). — LUZI
- = *Micropsectra notescens* (Walker).  
(Sæwedal 1976a:120). — IRSN.
- = Type material not found.
- = (cfr. p. ■■■). — BMNH
- = *Micropsectra janetscheki* Reiss.  
Zool. inst., Univ. of Innsbruck, Austria.
- = *Micropsectra junci* (Meigen).  
(Sæwedal 1976a:131) — MNHN
- = *Micropsectra lacustris* Sæwedal.  
NRS
- = *Paratanytarsus laetipes* (Zetterstedt).  
(Brundin 1949a:790) — LUZI
- = cfr. *trivialis* var. *lanceolatus*.
- = Described on ♀.  
Type material not found.

- lincki* Kieffer, 1911b:54  
(*Tanytarsus* (*Micropsectra*))
- lindebergi* Sæwæd, 1976a:111-114  
(*Micropsectra*)
- lindrothi* Goetghebuer, in Lindroth 1931:278-280  
(*Micropsectra*)
- lobatifrons* Botnariuc & Cure, 1956:257, 270  
(*Micropsectra*)
- logani* Johannsen, 1928a:33  
(*Tanytarsus* (*Micropsectra*))
- longimanus* Kieffer, 1909a:50  
(*Tanytarsus* (*Micropsectra*))
- longiradius* Kieffer, 1911b:60  
(*Tanytarsus* (*Micropsectra*))
- longitarsis* Kieffer, 1911b:54-55  
(*Tanytarsus*)
- longitarsis* Kieffer sensu Lindeberg 1967a:56-58  
(*Tanytarsus*)
- longitarsis* Zetterstedt, 1838a:816  
(*Chironomus*)
- longitibialis* Goetghebuer, 1935a:14  
(*Micropsectra*)
- miki* Marcuzzi, 1950a:274-275
- montana* Sæwæd, 1976a:134-135  
(*Micropsectra*)
- monticola* Edwards, 1929a:408  
(*Tanytarsus* (*Micropsectra*))
- nactus* Walker, 1856b:179-180  
(*Chironomus*)
- nanus* Meigen, 1818a:50  
(*Chironomus*)
- nepalensis* Sæwæd, 1976a:134  
(*Micropsectra*)
- nigripila* Johannsen, 1905a:287  
(*Tanytarsus*)
- nigrofasciata* Kieffer, 1922g:106  
(*Micropsectra*)
- notescens* Walker, 1856b:156-157  
(*Chironomus*)
- natvigi* Goetghebuer, 1933e:21  
(*Micropsectra*)
- occipiens* Walker, 1856b:165  
(*Chironomus*)
- offectus* Walker, 1856b:185  
(*Chironomus*)
- pallida* Goetghebuer, 1949a:7  
(*Micropsectra*)
- pallidulus* Meigen, 1830a:255  
(*Chironomus*)
- pharetophora* Fittkau  
(*Micropsectra*)
- piliger* Kieffer, 1922g:105  
(*Micropsectra*)
- politus* Malloch 1915b:493  
(*Tanytarsus*)
- praecox* Wiedemann, in Meigen 1818a:49 (nec auctt.)  
(*Chironomus*)
- praecox* auctt. (nec Wiedemann in Meigen, 1818)  
(*Micropsectra*)
- = Type material not found.
- = *Micropsectra lindebergi* Sæwæd.  
ZMUH
- = *Micropsectra lindrothi* Goetghebuer.  
(Sæwæd 1976a:116). — NMG
- = Described on the larval stage.  
Type material not found.
- = *Micropsectra logani* (Johannsen).  
A species in the *atrofasciata-bidentata*-group. Type material probably in CUL.
- = (cfr. p. ■■).
- = Type material not found.
- = *Micropsectra junci* (Meigen).  
(Sæwæd 1976a:131). — IRSN
- = *Tanytarsus bernhardi* Sæwæd.  
(Sæwæd 1982b:23-24). — ZMUH
- = cfr. Sæwæd 1982b:23-24.  
LUZI
- = *Parapsectra nana* (Meigen).  
(Reiss 1969a:205). — IRSN
- = A species in the *atrofasciata-bidentata*-group.  
NMW.
- = *Micropsectra montana* Sæwæd.  
CNC
- = *Parapsectra nana* (Meigen).  
(Reiss 1969a:205). — BMNH
- = *Micropsectra notescens* (Walker)  
(Sæwæd 1976a:120). — BMNH
- = *Parapsectra nana* (Meigen).  
(Reiss 1969a:205). — MNHN
- = *Micropsectra nepalensis* Sæwæd.  
CNC
- = *Micropsectra nigripila* (Johannsen).  
(Sublette & Sublette 1965a:178).  
(cfr. p. ■■). — CUL.
- = Type material not found.
- = *Micropsectra notescens* (Walker).  
(Sæwæd 1976a:120). — BMNH
- = *Paratanytarsus natvigi* (Goetghebuer).  
(Palmén 1960a:286-287). — IRSN
- = *Micropsectra notescens* (Walker).  
(Sæwæd 1976a:120). — BMNH
- = *Micropsectra notescens* (Walker).  
(Sæwæd 1976a:120). — BMNH
- = A species in the *atrofasciata-bidentata*-group.  
IRSN.
- = *Micropsectra pallidula* (Meigen).  
(Fittkau & Reiss 1976a:147). The species belongs to the *atrofasciata-bidentata*-group. (cfr. p. ■■).  
MNHN
- = Nomen nudum.
- = Type material not found.
- = *Micropsectra polita* (Malloch).  
(Sublette & Sublette 1965a:179).  
(cfr. p. ■■). — INS.
- = *Micropsectra junci* (Meigen).  
(Sæwæd 1976a:143). — NMW
- = *Micropsectra notescens* (Walker).  
(Sæwæd 1976a:120)



- praticola* Kieffer, 1911b:59-60  
(*Tanytarsus* (*Micropsectra*))
- proximalis* Goetghebuer, 1942b:3-4  
(*Micropsectra*)
- quadrilobus* Kieffer, 1922g:105-106  
(*Micropsectra*)
- quinaria* Kieffer, 1925b:225  
(*Micropsectra*)
- radialis* Goetghebuer, 1939f:382  
(*Micropsectra*)
- recurvata* Goetghebuer, 1928a:117  
(*Micropsectra*)
- repentina* Reiss, 1971a:136-137  
(*Micropsectra*)
- retusus* Goetghebuer, 1921a:128  
(*Tanytarsus*)
- roseiventris* Kieffer, 1909a:50  
(*Tanytarsus* (*Micropsectra*))
- rufofasciata* Kieffer, 1922g:103  
(*Micropsectra*)
- scandinavica* Kieffer in Kieffer & Thienemann, 1916a:500-501  
(*Syntanytarsus* (*Eutanytarsus*))
- semilunaris* Goetghebuer  
(*Tanytarsus*)
- septentrionalis* Kieffer, 1922b:7  
(*Natvigia*)
- sexannulatus* Goetghebuer, 1921a:126-127  
(*Tanytarsus*)
- shinaensis* Tokunaga, 1940b:306  
(*Tanytarsus* (*Micropsectra*))
- similatus* Malloch, 1915b:494-495  
(*Tanytarsus*)
- solitaria* Goetghebuer, 1949a:8  
(*Micropsectra*)
- styriaca* Reiss, 1969c:446  
(*Micropsectra*)
- subnitens* Goetghebuer, 1928a:115  
(*Micropsectra*)
- suecicus* Kieffer in Kieffer & Thienemann, 1916a:501-507  
(*Syntanytarsus* (*Eutanytarsus*))
- subviridis* Goetghebuer, 1921a:124  
(*Tanytarsus* *gmundensis* var. *subviridis*)
- taiwanus* Tokunaga, 1939a:336-337  
(*Tanytarsus*)
- tenellulus* Goetghebuer, 1921a:122  
(*Tanytarsus*)
- tenuis* Meigen, 1830a:255  
(*Chironomus*)
- terminalis* Kieffer in Kieffer & Thienemann, 1916a:504
- tetratomus* Kieffer, 1911b:56-57  
(*Tanytarsus* (*Micropsectra*))
- tonnoiri* Goetghebuer, 1921a:114  
(*Tanytarsus*)
- tori* Sæwedal, 1981a:27-30  
(*Micropsectra*)
- torta* Reiss, 1971a:140  
(*Micropsectra*)
- tricrenata* Kieffer, 1925b:225  
(*Micropsectra*)
- trivialis* Kieffer, 1911b:58  
(*Tanytarsus* (*Micropsectra*))
- = Type material not found.
- = Type material not found.  
(cfr. p. ■■■).
- = Type material not found.
- = Type material not found.
- = *Micropsectra coracina* (Zett.) Kieffer.  
(Reiss 1974b:205) — IRSN
- = *Micropsectra recurvata* Goetghebuer.  
IRSN
- = *Micropsectra repentina* Reiss.  
(cfr. p. ■■■). — CNC
- = *Paratanytarsus tenellulus* (Goetghebuer). N. syn.  
(cfr. p. ■■■). — IRSN
- = *Micropsectra roseiventris* (Kieffer).  
(cfr. p. ■■■). — IRSN
- = Described on ♀.
- Type material not found.
- = Nomen nudum.  
(cfr. p. ■■■).
- = Described on ♀.
- Type material not found.
- = A species in the *atrofasciata-bidentata*-group.  
IRSN
- = *Micropsectra shinaensis* (Tokunaga).  
KUJ
- = *Paratanytarsus similatus* (Malloch).  
N. comb. (cfr. p. ■■■). — INS.
- = A species in the *atrofasciata-bidentata*-group.  
IRSN
- = *Micropsectra styriaca* Reiss.  
(cfr. p. ■■■). — ZSM
- = A species in the *atrofasciata-bidentata*-group. IRSN
- = A species in the *atrofasciata-bidentata*-group. IRSN
- = *Micropsectra junci* (Meigen).  
(Sæwedal 1976a:138). —  
IRSN
- = *Micropsectra taiwanus* (Tokunaga).  
(Sublette & Sublette 1973b:416). — KUJ.
- = *Paratanytarsus tenellulus* (Goetghebuer).  
(Sæwedal & Langton 1977a). — IRSN.
- = *Paratanytarsus tenuis* (Meigen).  
(Reiss & Fittkau 1971a:82). —
- = Type material not found.  
(cfr. p. ■■■).
- = *Micropsectra notescens* (Walker).  
(Sæwedal 1976a:120). — IRSN
- = *Micropsectra roseiventris* (Kieffer).  
N. syn.  
(cfr. p. ■■■).
- = *Micropsectra tori* Sæwedal.  
ZSM
- = *Micropsectra torta* Reiss.  
CNC
- = Type material not found.
- = *Micropsectra apposita* (Walker).  
(Sæwedal 1976a:128) — IRSN

*trivialis* var. *lanceolatus* Kieffer, 1911b:59  
(*Tanytarsus* (*Micropsectra*))  
*tuberosa* Reiss, 1968c:70-72  
(*Micropsectra*)  
*unifilis* Kieffer in Thienemann, 1915b:46-47  
(*Tanytarsus*)  
*vernalis* Goetghebuer, 1931d:112  
(*Lundstroemia*)  
*viridiscutellata* Goetghebuer, 1931d:111  
(*Micropsectra*)  
*xantha* Roback, 1955a:4  
(*Calopsectra* (*Micropsectra*))  
  
*zernyi* Marcuzzi, 1950a:273  
(*Micropsectra*)

= Type material not found.  
  
= *Micropsectra tuberosa* Reiss.  
ZSM  
= Described on a ♀.  
Type material not found.  
= (cfr. p. ■■■).  
  
= A species in the *atrofasciata-bidentata*-group.  
IRSN  
= *Micropsectra xantha* (Roback).  
(Sublette & Sublette 1965a:179.  
cfr. Sæwæd 1981a:28). — ANSP.  
= A species in the *atrofasciata-bidentata*-group.  
NMW

## 9. Notes on critical species

*Micropsectra affectus* (Walker) and *M. effectus* (Walker)

Goetghebuer (1937-54: 90) mentioned *M. affectus* (Walker) in a list of synonyms. The name *M. effectus* (Walker) was referred to by Goetghebuer in another list of synonyms (1928a: 117). I have not found descriptions of these species in any of Walker's papers. It is, however, most probable that *affectus* and *effectus* are mistakes for the species name *Chironomus effectus* Walker (= *Micropsectra notescens*).

### *Micropsectra angorensis* Kieffer

This species was described on female material from Angora in Asia Minor. The type material was deposited in MNM. It has not been possible to find it in that collection, however (L. Papp pers. comm.). The type of *Calopsectra chlorogaster* is in the MNM collection and this species was described in the same paper (Kieffer 1918b: 118) as *M. angorensis*. Thus, Kieffer might have sent his type material of *angorensis* to Budapest.

*Syntanytarsus* (*Eutanytarsus*) *brevimanus* Kieffer

The species was described by Kieffer on (one?) ♀ collected by Thienemann in a limnocratic spring at Tinkarp near Helsingborg, Sweden. Thienemann (1924b: 332-333) could not separate the pupa of *S. brevimanus* from that of *Micropsectra roseiventris* s.lat. The larval tubes were of the same type. The only difference found was that the tubes of *S. brevimanus* were se-

parate, while in *M. roseiventris* they form bundles of many tubes. From the information given by Thienemann it seems probable that *S. brevimanus* is a synonym of *M. roseiventris*.

### *Chironomus brunneus* Walker

The homonymy problems of *C. brunneus* Walker and *C. brunneus* Freeman have been discussed by Sæwæd (1981b).

### *Micropsectra campestris* (Meigen)

Goetghebuer (1928a:117) expressed doubts when synonymizing *Micropsectra campestris* with *M. gmundensis* (Egg.) (= *M. junci*). I have not been able to trace the description of this species. Fittkau & Reiss (1976a:148) listed 2 ♂♂ as number 109 in Coll. Meigen, MNHN. Both males lack the abdomen, thus making an identification impossible.

*Chironomus confinis* Walker and *C. connexus* Kieffer

The name *C. confinis* Walker, 1848, was recognized as a homonym of *C. confinis* Meigen, 1830 by Kieffer (1906c:17). The replacement name *C. connexus* was proposed. Male and female of *C. confinis* were described on material from St. Martin's Falls, Albany River, Hudson's Bay. I have studied the male which is preserved in BMNH. Present status: *Micropsectra connexa* (Kieffer, 1906). The species is very similar to *Micropsectra xantha* (Roback) but differs from this species by longer and broader anal point.

**Chironomus coracinus** Zetterstedt and **C. gracilentus** Holmgren

*Chironomus coracinus* was described by Zetterstedt (1850a: 3508–3509). It was transferred to genus *Sergentia* Kieffer, 1921 by Goetghebuer (1928a: 107). *Sergentia* is a member of tribe Chironomini. When Kieffer (1911b:42) described the Tanytarsini genus *Lauterbornia* (= *Micropsectra*), he designated *Chironomus coracinus* Zetterstedt type of the genus. This has been regarded as a misidentification and the species has been referred to as *Lauterbornia coracina* (Zett.) Kieffer. This is not in accordance with the Code, art. 49 (1964). A further complication is the fact that *Chironomus coracinus* Zetterstedt sensu Kieffer is the type species of the genus *Lauterbornia*. A change would require an action according to article 70a of the Code. Including a revision of the type material of *Chironomus coracinus* Zetterstedt.

Goetghebuer (1937–54: 93) regarded *L. coracina* as a synonym of "*Lauterbornia gracilentus*" of Holmgren (1869) but (1869) Holmgren does not mention the species. The description was published by Holmgren in 1880a (p. 181). The type material will be revised in a forthcoming paper.

**Micropsectra dives** (Johannsen)

*Tanytarsus dives* Johannsen, 1905a: 288–290 was described on material from North America. It was transferred to *Micropsectra* by Sublette & Sublette (1965a:178). The original description gives the impression that the pupa possesses the same dorsal abdominal armature as that of *Parapsectra*, and the same number of lateral setae on pupal segment VIII (Johannsen 1905a: pl. 26, fig. 6). Later, the description of the pupa was corrected (Johannsen 1937b). Evidently, the dorsal armature is of *Micropsectra* type. The larva was described as having a dorsal hump on the last abdominal segment (Johannsen 1905: 288, fig. 5), but in fact the hump is on the penultimate (XI) abdominal segment (Johannsen 1937b: 13).

**Tanytarsus dubius** Malloch

This species was listed under *Micropsectra* by

Sublette & Sublette (1965a: 178). The study of the type material showed that it is a member of genus *Paratanytarsus*. A redescription of the species is under preparation.

**Micropsectra fusca** (Meigen) and **M. roseiventris** (Kieffer)

Fittkau & Reiss (1976a: 147) found one female of *Chironomus fuscus* in coll. Meigen, MNHN. The status of the species must remain open until more *Micropsectra* females have been properly examined. *M. fusca* has often been regarded as a senior synonym of *M. roseiventris*, but no proofs have been presented. I have listed them as species propriae. The holotype male of *M. roseiventris* was redescribed by Reiss (1974b: 205–207).

**Tanytarsus tenuis** (Meigen) sensu Kieffer versus **Micropsectra hydra** (Kieffer)

A description of female *Tanytarsus tenuis* (Meigen) was presented by Kieffer (in: Kieffer & Thienemann 1908a:80–81) and repeated in 1909a:52). The larva and pupa of *T. tenuis* were described by Thienemann (in: Kieffer & Thienemann 1908a:279–281). Bause (1913a:52) found that the larva described by Thienemann belonged to what Bause called the *exiguus* group (= *Rheotanytarsus*) of genus *Tanytarsus* and the pupa to the *inermipes* group (= *Micropsectra*). The explanation was that a mistake had been made when the material was reared. Bause (l.c.p. 52) found, however, that the female described by Kieffer belonged to the pupal exuvium. The species *T. tenuis* is a member of the *inermipes* group (= *Micropsectra*). At the same time Kieffer (1913e: 197) discovered that he had misidentified the species and proposed the name *Tanytarsus hydra* for *Tanytarsus tenuis* (Meigen) sensu Kieffer 1908a: 80–81. Present status of *tenuis* Meigen: *Paratanytarsus tenuis* (Meigen).

**Chironomus intrudens** Walker

For the description, male and female were available, but in BMNH only one female is present. The male has not been refound.

**Tanytarsus (Micropsectra) longimanus** Kieffer

It has not been possible to find the type mate-

rial of this species. In coll. Kieffer in IRSN there is one specimen mounted on a slide. The specimen lacks genitalia and some other details and there is no indication that it is a "type" specimen. F. Reiss (pers. comm.) has seen a specimen with type label in coll. Kieffer, IRSN. Until this specimen has been refound, the identity of *M. longimanus* will remain obscure.

#### *Micropsectra nigripila* (Johannsen)

The holotype ♂ is deposited in CUI. It is poorly mounted but has many morphological characters in common with *M. lindrothi*. The specimen has been dissected and mounted under a glass cover which makes remounting without further damage very difficult. A redescription is being prepared.

#### *Micropsectra pallidula* (Meigen)

The type material of this species consists of 2 males (one without abdomen) and 1 female, kept under number 58 in coll. Meigen, MNHN (Fittkau & Reiss 1976a: 147). It has not been possible to have the material for loan but, I have had access to drawings of the type material made by E. J. Fittkau. The drawings reveal that the species is a member of the *atrofasciata-bidentata*-group.

#### *Micropsectra polita* (Malloch)

A specimen labelled as lectotype is deposited in INS. It has been studied by me. The lectotype label gives no details and no reference to a lectotype designation has been found.

#### *Micropsectra proximalis* Goetghebuer

It has not been possible to find the type material; 3 pinned specimens in IRSN are not types (F. Reiss pers. comm.).

#### *Micropsectra repentina* Reiss

The males of *M. repentina* and a morphologically similar, still undescribed species have many characters in common with species of *Krenopsectra*. The superior volsellae have nearly the same form, a digitus is present but is weakly developed, the anal point and its crests

are similar. But the pupa of the undescribed species, which has been referred to as *M. pharetophora* in a number of papers, possesses a typical *Micropsectra* abdominal armature. This confirms that *M. repentina* is a member of *Micropsectra*.

#### *Tanytarsus semilunaris* Goetghebuer

In IRSN one male, labelled "TYPE". The specimen is a member of the *notesens* group of the genus *Micropsectra*. It was collected near Virton, Belgium. No description of *T. semilunaris* has been published (cfr. Reiss & Fittkau 1971a: 81).

#### *Paratanytarsus similatus* (Malloch)

Primarily the species was referred to genus *Tanytarsus*. It was transferred to *Micropsectra* by Sublette & Sublette (1965a: 179), but belongs to genus *Paratanytarsus*.

#### *Micropsectra styriaca* Reiss

This species was described on males from Central Europe and referred to genus *Micropsectra*. Recently the pupa has been obtained by rearing and its morphology justifies a transference of the species to *Parapsectra* (F. Reiss pers. comm.); it possesses a pair of round fields of short spinules on the anterior parts of tergites II–VI, a pattern found in *Rheotanytarsus*, while pupae of genus *Parapsectra*, as far as known possess paired fields on tergites III–VI. These patterns are plesiomorphic, however, and cannot be used for delimiting the taxa. Male *M. styriaca* has no digitus and is in this respect similar to *Krenopsectra*.

#### *Micropsectra taiwanus* (Tokunaga)

The type material of this species has been studied by me. It consists of one badly preserved male which lacks hypopygium.

#### *Tanytarsus tonnoiri* Goetghebuer

This species was synonymised with *Micropsectra fusca* by Goetghebuer 1928a: 116 (cfr. p. ■■■). The reasons were not mentioned but according to the drawings presented by Goetghebuer (1921a: 114, figs. 117, 118) the species is

a synonym of *Micropsectra roseiventris* (Kieffer, 1909). I have not studied the type.

### *Lundstroemia vernalis* Goetghebuer

Goetghebuer proposed the name *vernalis* as a replacement name for *L. praecox* Goetghebuer nec Wiedemann. *Chironomus praecox* Wiedemann is a synonym of *Micropsectra junci* (Meigen) (cfr. Sæwæd 1976a: 131, 143), while the identity of *L. praecox* Goetghebuer (and *L. vernalis* Goetghebuer) is unknown.

### 10. Designation of lectotype

#### *Tanytarsus retusus* Goetghebuer, 1921

The male described on material from Belgium. In IRSN one male mounted on a slide is labelled "TYPE, ♂, M. Goetghebuer" on a yellow label. "Destelbergen 20.5.15", "Syntype" with red letters on white label, "= tenellulus Goetgh. !, rev. Brundin 1952", "Coll. et det. M. Goetghebuer, *Micropsectra retusa* Goetgh. R.I.Sc.N.B. 18.073", "cfr. Mem. Mus. Hist. nat. Belg., mem. 31. 1921. p. 128". I have selected this specimen as the lectotype and labelled it accordingly.

Synonymy: *Paratanytarsus tenellulus* (Goetghebuer, 1921), syn.: *Tanytarsus reusus* Goetghebuer, 1921. N. syn.

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# *Micropsectra lacustris* n.sp., eine neue Chironomiden-Art (Diptera: Chironomidae) aus Schweden

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Ent. scand. 6. 1975. 52—56.

## Abstract

Male and pupa of a new chironomid species, *Micropsectra lacustris*, are described. The species was found in two lakes, Leipikvattnet (alt. 468 m a.s.) and Stora Blåsjön (alt. 533 m a.s.), in Jämtland, Sweden. Stora Blåsjön is located in the

northern coniferous region, Leipikvattnet in the transition zone between the former region and the birch region. The lakes are oligohumic (Leipikvattnet) and extreme oligohumic (Stora Blåsjön), respectively.

Bei Vorbereitung einer Revision der Gattung *Micropsectra* Kieff. fand der Verfasser in coll. Brundin einige Individuen die als *Micropsectra lacustris* n. sp. bezeichnet waren. Die Art besitzt sehr charakteristische Merkmale im Hypopyg. Besonders die Lamellenborsten am Anhang 2a weisen eine ungewöhnliche Form auf. Deshalb erscheint es als zweckmässig die Art zu beschreiben. Die systematische Stellung von *Micropsectra lacustris* n. sp. innerhalb der Gattung ist vorläufig nicht zu beurteilen, da die Systematik einer grossen Anzahl Arten der Gattung nicht geklärt ist. *Micropsectra lacustris* n. sp. besitzt aber Merkmale die darauf deuten, dass es sich um eine neue Artengruppe handelt.

Für die Überlassung seines grossen *Micropsectra*-Materials aus ganz Schweden und besonders auch die Spezies *Micropsectra lacustris* n. sp. bin ich Herrn Professor Dr. L. Brundin, Stockholm, sehr zu Dank verpflichtet. Für wertvolle Diskussionen und Entleihung von Material bin ich auch Dr. E. J. Fittkau, Plön, und Dr. F. Reiss, Plön, sehr dankbar. Für wertvolle Hinweise bezüglich des Manuskriptes bin ich Dr. Ch. Dahl, Lund, verpflichtet.

*Micropsectra lacustris* n. sp.

Locus typicus: See Leipikvattnet in Jämtland, Schweden.

Holotypus: 1 ♂ in Naturhistoriska Riksmuseum, Stockholm.

Paratypen: 2 ♂♂ vom See Leipikvattnet in Jämtland, Schweden und 1 ♂ mit dazugehöri-

gem Puppenexuvium vom See Stora Blåsjön in Jämtland, Schweden.

## Beschreibung

Der Beschreibung zu Grunde liegendes Material: Der Holotypus und die 3 Paratypen.

Imago ♂:

Grösse: Flügellänge 2,2 mm (n=1).

Färbung: Kopf und Thorax bräunlich gelb, Abdomen und Beine weissgelb.

Kopf: Stirnzapfen vorhanden, ziemlich gut entwickelt. Augen nackt, die Scapi halbmondförmig umgreifend. A.R. 0,95 (n=1). Vertexborsten 10 (n=1), einreihig. Clypeusborsten 15—23 (n=3). Palpen mit vier freien Gliedern. Länge der Glieder 1—4 in  $\mu$ m: 58 (55—63), 162 (147—168), 140 (139—143), 244 (210—261).

Thorax: Antepronotum median gespalten, vom Mesonotum überragt, lateralwärts breiter werdend, ohne Median- oder Lateralborsten. *dlm* am Pronotum beginnend. *dl* 10 (n=1). *pa* 2—3 (n=2). *sc* in einer Reihe.

Flügel: Abb. 1. Mit schwach entwickelter Behaarung zum grössten Teil auf die distalen 2/3 der Flügel beschränkt. Die Adern, mit Ausnahme von *sc*, *r*<sub>2+3</sub>, dem basalen Teil von *m* bis zu der Querader *r-m* und dem basalen 1/4—1/2 von *cu*, mit Machrottrichien bewachsen. Basalader mit 2 Langborsten. Squama nackt.

Tab. 1. Längenverhältnisse und Messwerte der Beinglieder ( $\mu\text{m}$ ,  $n = 1$ ).

|                  | Fe    | Ti  | Ta <sub>1</sub> | Ta <sub>2</sub> | Ta <sub>3</sub> | Ta <sub>4</sub> | Ta <sub>5</sub> | L.R. |
|------------------|-------|-----|-----------------|-----------------|-----------------|-----------------|-----------------|------|
| P <sub>I</sub>   | 930   | 713 | 1 059           | 525             | 406             | 317             | 149             | 1,49 |
| P <sub>II</sub>  | 910   | 752 | 455             | 257             | 198             | 129             | 89              | 0,61 |
| P <sub>III</sub> | 1 089 | 960 | 693             | 426             | 327             | 208             | 104             | 0,72 |

c über  $r_{4+5}$  nicht verlängert.  $r_{2+3}$  nur schwach angedeutet. *fcu* distal von *r—m*, *an* endet in der Höhe von *fcu*. Kräftige Scheinadern entlang den *cu*-Adern. Schwache Scheinadern entlang von *an* und dem distalen Teil von *m*.

**Beine:** Masse und Längenverhältnisse der Beine (Tab. 1).

Vordertibia mit einem kurzen Sporn. Mittel- und Hinterfemura mit einem distalen Innen-sporn. Tibialkämme verschmolzen, ohne Spor-

ne. Klauen schlank, distal einspitzig. Pulvilli klein.

**Hypopyg:** Abb. 2, 3 und 4. Mit A Anhangsparen. Analtergit mit auffallend grossen Lateralzähnen und etwa 5 Analtergitborsten mit deutlichen Basalsockeln. Analtergitbänder gut getrennt. Analspitze basal breit erscheinend und dort mit wohl entwickelten Analkämmen, distal davon schmal zugespitzt. Der mediane Buckel des Analsegmentes bei Seitenansicht deutlich hervorstehend (Abb. 3). Auf jeder Seite der Analspitze 2—3 laterale Analspitzenborsten.

Anhänge 1 basal parallelseitig, distal etwas medianwärts gebogen und abgerundet. 5—7 Borsten auf der Dorsalseite und 2 distale Borsten.

Anhänge 1a ziemlich lang, ihre Spitze ausserhalb der Kante der Anhänge 1 sichtbar.

Anhänge 2 distal mit etwa parallelen Seiten. Im basalen Teil verschmälert. Der Distale 1/3 mit Langborsten besetzt.

Anhänge 2a (Abb. 4) lang und schlank ( $74\text{—}79\ \mu\text{m}$ ;  $n = 2$ ), s-förmig geschwungen. Die Innenseite der Anhänge ist auf der basalen 1/2 mit einfachen Borsten bewachsen. Das distale 1/5 mit Lamellenborsten besetzt. Die Lamelle ist in feine Spitzen verzweigt.

Endglieder plump gebaut, distal schräg abgestutzt.

**Artspezifische Merkmale:** A.R. sehr niedrig. Form der Analspitze und die Ausbildung der Analkämme. S-förmige Anhänge 2a sowie vor allem die Form ihrer distalen Lamellenborsten.

Imago ♀:

Nicht bekannt.

Puppe:

Grösse: 3,2 mm (ohne Cephalothorax).

Färbung: Puppenexuvium hyalin. Die Analkämme, Muskelmale und der Ansatzpunkt der Flügelscheide dunkler pigmentiert.

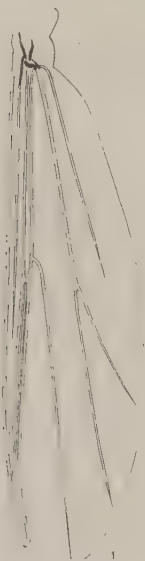


Abb. 1. *Micropsectra lacustris* n. sp. Flügel. Behaarung ausgelassen.



Abb. 2. *Micropsectra lacustris* n. sp. Hypopyg dorsal. Sklerite schraffiert (del. F. Reiss).

**Cephalothorax:** Oralhörnchen kräftig, mit langer Borste. Thorakalhörn (Abb. 5) 220  $\mu$ m lang (ohne Borsten), distal zugespitzt, lateral auf der apikalen 1/2 mit Borsten besetzt, an der Spitze sitzen die Borsten an zwei Seiten.

**Chaetotaxie des Thorax:** Beiderseits 6 orale Thorakalborsten ( $Oth_{1-6}$ ).  $Oth_{1-3}$  sitzen oral der Thorakalhörn basis,  $Oth_4$  oral davon.  $Oth_{5-6}$  sitzen an der Basis der  $P_1$ -Scheiden.

4  $Mth$ -Borsten in zwei weit auseinanderstehenden Paaren.  $Mth_{1-2}$  apikal zum Ansatz der Flügelscheide und in der Nähe der Thorakalnaht.  $Mth_{3-4}$  stehen kaudal zwischen dem Ansatz der Flügelscheide und der Thorakalnaht.  $Mth_{3-4}$  stehen eng zusammen.

**Abdomen:** Abb. 6. Tergit I mit einer sehr feinen chagrinierten Fläche oral an jeder Seite. Tergit II mit einfacher Querreihe oralwärts



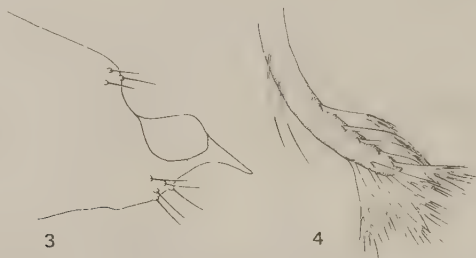
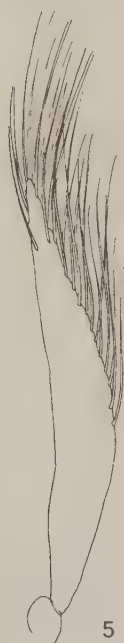


Abb. 3. *Micropsectra lacustris* n. sp. Analspitze lateral (del. F. Reiss).

Abb. 4. *Micropsectra lacustris* n. sp. Anhang 2a des Hypopygs. Distal leicht gequetscht (del. F. Reiss).



5

Abb. 5. *Micropsectra lacustris* n. sp. Thorakalhorn der Puppe (del. L. Brundin).



6

Abb. 6. *Micropsectra lacustris* n. sp. Abdominaltergite II—V. Dorsalbeborstung ausgelassen.

gebogener Haken, die etwa die Hälfte der Segmentbreite einnehmen. Pseudopodien am gleichen Segment. Mit Ausnahme von zwei Längsstreifen lateral der Muskelnmale, zwei apikalen halbmondförmigen Flächen und einer analmedianen Fensterfläche sonst mit Chagrin bedeckt. Lateral der Muskelnmale sehr fein chagriniert, die Chagriniierung nimmt die apikale Hälfte der Segmente ein. Tergit III mit zwei Feldern von Langspitzen die analwärts länger werden. Zwischen den beiden Langspitzenfeldern fehlt auf der kaudalen Hälfte die Chagriniierung. Frei von Chagrin bleiben auch zwei apikale halbmondförmige Flächen und zwei Längsstreifen lateral von den Muskelnmalen. Lateral der Muskelnmale sehr fein chagriniert, die Chagriniierung nimmt etwa 3/4 der Segmente ein. Tergit IV mit zwei Langspitzenplatten die apikal durch kleinere Spitzen in Verbindung stehen. Die Chagriniierung wird zu einem schmalen Streifen lateral der Langspitzenplatten und zu zwei Bändern die von der apikalen Ecke der Tergite bis zur apikalen Seite der Langspitzenplatten gehen. Tergit V mit zwei Langspitzenplatten die apikal mit zwei Kurzspitzenplatten in Verbindung stehen. Kurzspitzenplatten voneinander getrennt. Chagriniierung in zwei kleinen Flächen kaudal der Langspitzenplatten. In zwei Bändern von den Kurzspitzenplatten bis zu den Ecken der Tergite gehend. Tergit VI median mit zwei Chagrinbändern auf dem kaudalen 2/3 des Segmentes. An den apikalen Ecken mit Chagrinflecken. Tergit VII und VIII nur an den

vorderen Ecken mit Chagrinflecken. Anal-kämme mit drei spitzigen Zähnen die in einer Reihe stehen. Die 2 Inneren kleiner als der äussere Zahn. Schwimmplattenlobus mit 23 Schlauchborsten. Schlauchborsten der Schwimmplatte einreihig, nicht so dicht sitzend. Schlauchborsten von Segment IV—VIII: 2 : 3 : 4 : 4 : 5.

Larve:

Nicht bekannt.

*Verbreitung:* Schweden. Jämtland: See Leipikvattnet (Grönholmen), 3 ♂♂ (Holotypus und 2 Paratypen), 6.VII.1946, leg. L. Brundin. — See Stora Blåsjön, 1 ♂ + Puppenexuvium (Paratypus), 4.VII.1946, leg. A. Määr.

*Ökologie:* Die bisherigen Funde stammen von Seen in der oberen Nadelwaldregion (Stora Blåsjön, 533 m ü.d.M.) und im Übergangsbereich zwischen der Nadelwald- und der Birkenregion (Leipikvattnet, 468 m ü.d.M.). Der See Leipikvattnet ist oligohumos und der See Stora Blåsjön ist extrem oligohumos. Eine Beschreibung dieser beiden Seen gibt Brundin 1949 p. 511—526 und 572.

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# Revision of the *notescens*-group of the genus *Micropectra* Kieffer, 1909 (Diptera: Chironomidae)

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Lund, Sweden, 15 June 1976

## Abstract

The Palearctic species in the *notescens*-group of the genus *Micropectra* Kieffer are revised. Six species are redescribed and three new species, *Micropectra lindebergi*, *M. montana* and *M. nepalensis* are described. Lectotypes are designated for 19 species and a neotype is designated for *M. insignilobus* Kieffer. The females and pupae are included as far as they are known. - Morphologically some of the species are very similar. In one case the only morphological difference between two species is found in the females. An analysis, presented in graphs and tables, is given to make it possible to separate the males of *M. insignilobus* and *M. lindebergi*, two morphologically very similar species. Most of the species which are difficult to separate on morphological grounds have a marked difference in their ecology, thus making an identification possible. - Notes on the distribution and ecology of the species are given. - Keys to the males and pupae of the species in the *notescens*-group are presented.

## Introduction

The genus *Micropectra* Kieffer was proposed in 1909 as a subgenus of *Tanytarsus* van der Wulp. Later Kieffer considered it a genus and designated *M. inermipes* (Kieffer) (= *notescens* Walker) as the type of the genus. The genus consists of about 100 nominal species, most of them described as members of the genera *Chironomus* and *Tanytarsus*. In a recent paper, Reiss (1969: 431) estimated the number of valid species to about 40. The *notescens*-group contains 9 known species. The *attenuata*-group, treated in a revision by Reiss (op. cit.), contains 5 species. Other important species-groups are the *lacustris*-group, the *recurvata*-group, and the *atrofasciata-bidentata*-group which will be treated in a future paper together with a general treatment of the genus. Detailed knowledge of the genus *Micropectra* is important for the understanding of the relationships within the *Tanytarsini*. It is closely related to the genera *Krenopsectra* Reiss, *Parapsectra* Reiss, *Paratanytarsus* (Bause) Kieffer, *Oeklandia* Kieffer, and *Lauterbornia* Kieffer.

The *notescens*-group constitutes an important part of the genus both from systematic and ecological aspects. It contains species whose larvae live in the profundal zone of lakes as well as species whose larvae inhabit running waters. The systematics of the group is difficult and a closer study has revealed the presence of morphologically very similar species. The species can usually be identified in the imaginal (♂♂) and the pupal stages. The larvae are too poorly known to permit reliable identification.

In one case, a morphological difference between two species was found only in the females. Diagnosis of the larvae and females as well as keys to these stages will be given in a future paper.

The species of the genus *Micropectra* have a wide distribution in the holarctic region. In the *notescens*-group specimens from Nepal, Caucasus, Greenland, South-, Central- and North Europe (including Iceland) have been studied. In the present paper emphasis is laid on the Palearctic species.

The new synonymy is throughout based on thorough studies of all available original material. Unfortunately the type material of *Tanytarsus* (*Micropectra*) *daisenensis* Tokunaga, 1938 and *Tanytarsus* (*M.*) *fossarum* Tokunaga, 1938 has not been found in the collections of the Kyushu University, Japan. According to Tokunaga (in litt.) the type material of these species was deposited in this museum. These species may belong to the *notescens*-group.

## Group diagnosis

The *notescens*-group consists of species with a wing length of 2.13-3.74 mm. The ♂♂ are characterized by the more or less finger-shaped appendage 1 which is bent in median direction. Appendage 1a is always present and of varying size, in most species reaching tip of appendage 1. Appendage 2 with nearly parallel margins or with ball-shaped swelling at tip. Appendage 2a of varying length with spoon-shaped or leaf-like lamellar bristles at tip. Anal point normally

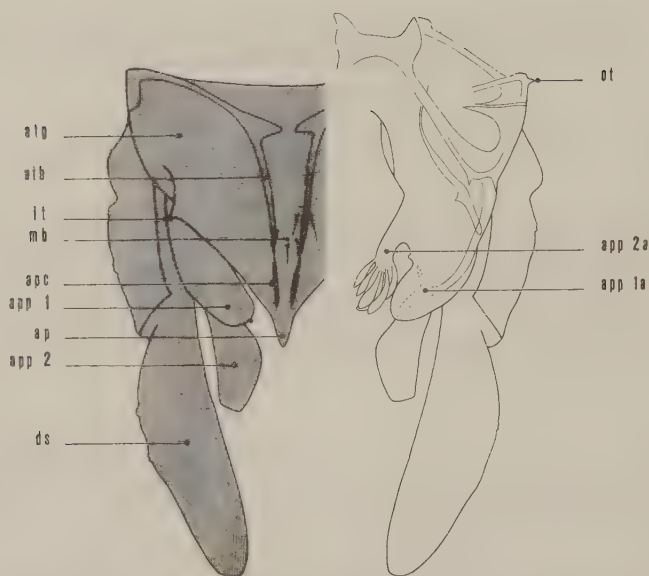


Fig. 1. *Micropsectra lindrothi*. Schematic drawing of hypopygium. Dorsal view. Ap, anal point; apc, anal point crests; app 1-2a, appendages of the hypopygium; atb, anal tergal band; atg, anal tergite; ds, dististylus; lt, lateral tooth; mb, median bristles; ot, oral-lateral tooth.

acute. Anal comb crests usually well developed.

A discriminating diagnosis of the ♀♀ imagines is at present impossible to give.

In the pupal stage, the *notescens*-group is best characterized by the particular arrangements of the fields of long and short spinules on the tergites III-V, which occur generally in the *Micropsectra* species. Tergite III with two fields of long spinules and tergites IV-V each with two fields of short spinules. In posterior direction from each field there is a row of relatively fine shagreenation. In two species (*M. contracta* and *M. apposita*) tergite IV has an additional armament of rather long spinules situated in two rows posteriorly of the fields with short spinules. Segment IV with either 3 LS or 2 LS and 1 L-hair (LS=lateral filamentous hair. L-hair=lateral hair). Segment II-III each with 3 L-hairs, segment V with 3 LS-hairs, segments VI-VII each with 4 LS-hairs and segment VIII with 5 LS-hairs.

#### KEY TO THE PALEARCTIC SPECIES

##### Imagines ♂♂

(The key is based mainly on characters of the hypopygia, the terminology of which is given in fig. 1).

- 1 (2) Appendage 2a with leaf-shaped lamellar bristles at tip (fig. 8) ..... 3. *M. lindrothi* Goetgh. (p. 116)
- 2 (1) Appendage 2a with spoon-shaped lamellar bristles at tip (figs 2, 44)
- 3 (6) Anal point crests poorly developed (figs 2, 27, 34). Anal point short and acute. Appendage 1 with a few microtrichia in a dorso-median position (fig. 2). Dististyles towards tip not gradually narrowing.
- 4 (5) A.R.=1.30-1.58. LR (P<sub>I</sub>) = 1.24-1.38. LR (P<sub>II</sub>) = 0.48-0.55. Appendage 2a 50-75 μm. Hypopygium fig. 2 ..... 1. *M. lindebergi* n.sp. (p. 111)
- 5 (4) A.R.=1.47-1.83. LR (P<sub>I</sub>) = 1.34-1.51. LR (P<sub>II</sub>) = 0.55-0.63. Appendage 2a 40-59 μm ..... 2. *M. insignilobus* Kieff. (p. 115)
- 6 (3) Anal point crests more strongly developed (cf. figs 10, 29, 35). Anal point usually longer

- and not so acute. Appendage 1 with a larger number of microtrichia (figs 10, 43) in a dorso-median position or microtrichia completely lacking (in *M. nepalensis*). Dististyles gradually narrowing towards tip.
- 7 (8) Appendage 2 with tip forming a ball-shaped swelling (fig. 10) ..... 4. *M. notescens* (Walker) (p. 120)
- 8 (7) Appendage 2 without ball-shaped swelling at tip. Lateral margins of appendage 2 more or less parallel (cf. fig. 17).
- 9 (10) Appendage 1 and appendage 2a with bases in the same plane (fig. 21) ..... 5. *M. contracta* Reiss and 6. *M. apposita* (Walker) (cf. p. 124, 128)
- 10 (9) Appendage 1 and appendage 2a with bases in different planes (fig. 22).
- 11 (12) Appendage 1 triangular. Appendage 1 a short and hook-shaped (fig. 32) ..... 8. *M. nepalensis* n.sp. (p. 134)
- 12 (11) Appendage 1 finger-shaped. Appendage 1a never hook-shaped.
- 13 (14) Anal point with parallel margins and tip rounded. Appendage 2 without transverse ridge (fig. 33) ... 9. *M. montana* n.sp. (p. 134)
- 14 (13) Anal point with tip acute. Appendage 2 with a transverse ridge (fig. 24) ..... 7. *M. junci* (Meig.) (p. 131)

### Pupae

(The terminology used in the key and in the descriptions of the pupae is given in fig. 13. The character [number of filamentous hairs on anal lobe] given for separating *M. insignilobus* and *M. lindebergi* is uncertain since only a small number of pupae have been available of these species. It is moreover possible that the shape of the caudolateral combs of segment VIII, given as a character for separating *M. insignilobus* and *M. lindebergi* from *M. lindrothi*, will be found to vary in a larger material. *M. lindrothi* differs, however, ecologically from the other two species, thus making it possible to separate them. The number of filamentous hairs on anal lobe given as character for separating *M. contracta* and *M. apposita* is also uncertain since only a small number of pupae belonging to *M. apposita* have been available for study. These two species show a considerable difference in ecology which makes it possible to identify the pupae).

- 1 (2) Cephalothorax with a tubular structure in front of the wing sheaths (fig. 25) ..... 7. *M. junci* (Meig.) (p. 133)
- 2 (1) Cephalothorax without a tubular structure in front of the wing sheaths (fig. 13).
- 3 (8) Segment IV with 3 LS.
- 4 (5) Thoracic horn with bristles about  $2/3-1/3$  of length of thoracic horn. Caudo-lateral combs of segment VIII broad with fine spines ..... 3. *M. lindrothi* Goetgh. (p. 119)
- 5 (4) Thoracic horn with bristles about  $1/5-1/6$  of length of thoracic horn (fig. 7). Caudo-lateral

combs of segment VIII narrow with rather coarse spines.

- 6 (7) Anal lobe with a simple row of 42-52 filamentous hairs ..... 1. *M. lindebergi* n.sp. (p. 113)
- 7 (6) Anal lobe with a simple row of 53-60 filamentous hairs ..... 2. *M. insignilobus* Kieff. (p. 116)
- 8 (3) Segment IV with 2 LS and 1 L-hair.
- 9 (10) Tergite IV without a row of rather long spinules in posterior direction from each of the fields with short spinules (fig. 19) ..... 4. *M. notescens* (Walker). (p. 121)
- 10 (9) Tergite IV with a row of rather long spinules in posterior direction from each of the fields with short spinules (fig. 20).
- 11 (12) Anal lobe with 53-55 filamentous hairs ..... 6. *M. apposita* (Walker) (p. 130)
- 12 (11) Anal lobe with 69-90 filamentous hairs ..... 5. *M. contracta* Reiss (p. 127)

## Description of the species of the *notescens*-group

### 1. *Micropsectra lindebergi* n.sp. (Figs 2-5, 14, 39, 45)

*Type locality:* Finland, Lake Kilpisjärvi.

*Holotype:* 1 ♂ labelled "Finland. Lake Kilpisjärvi, 28.VI.1968, leg. B. Lindeberg". Type mounted on microscopic slide in Euparal, in coll. ZMUI. *Paratypes:* 19 ♂♂ labelled "Finland. Lake Kilpisjärvi, 28.VI.1968, leg. B. Lindeberg". 16 ♂♂ in coll. ZMUI and 3 ♂♂ in coll. LUZI.

*Additional material studied:* Finland: Le. Lake Kilpisjärvi, 4 ♂♂ (with pupal exuviae) 22.VI.1969, 1 ♂ (with pupal exuvium) 28.VI.1969, leg. L. Paasivirta. - Li. Lake Inarijärvi, Ukonselkä, 6 ♂♂ 27.VI.1971; Lake Inarijärvi, Siejdlassa, 10 ♂♂ 30.VI.1971; Lake Inarijärvi, Lintusaaret, 14 ♂♂ 28.VI.1971, 1 ♂ 8.VII.1971, leg. P. Virtanen. - Sa. Lake Puruvesi, Koivusaari, 1 ♂ 29.V.1960; Lake Puruvesi, 1 ♂ 4.IX.1969, 2 ♂♂ 17.V.1970; Lake Puruvesi, Särkäniskelä, 2 ♂♂ 25.V.1970; Lake Puruvesi, Myhkiö, 4 ♂♂ 25.V.1970, leg. B. Lindeberg. Germany: Lake Stechlinsee, 11 ♂♂ 1.VII.1963, leg. G. Mothes. Sweden: Jmt. Lake Stora Blåsjön, 13 ♂♂ 17.VI-1.VII.1946, leg. A. Määr. - Sm. Lake Vättern, 2 ♂♂ 15.V.1972, leg. T. Wiederholm.

### Description

IMAGO MALE: *Wing length:* 2.6-3.5 mm.

*Colour:* Thorax all black. Legs and abdomen blackish brown. Halteres rather dark.

*Head:* Frontal tubercles small. A.R.=1.30-1.58 (cf. Tab. 1).

*Thorax:* Acrostichals reach antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealars 3-4. Scutellars in one row.



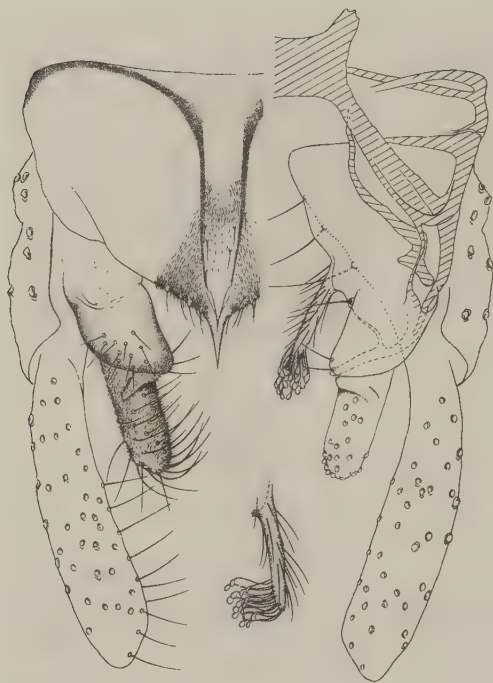


Fig. 2. *Micropsectra lindbergi*. Hypopygium. Dorsal view. (del. F. Reiss).

**Wing:** Macrotrichia on distal  $\frac{3}{4}$  of wing. The fields between c and r4+s and the field caudal of an are free from macrotrichia. All veins except sc, r2+3, cross-vein r-m, the basal  $\frac{1}{2}$  of r4+s, the basal  $\frac{2}{3}$  of m and the basal  $\frac{2}{3}$  of cu covered with macrotrichia. Stem vein with 1-2 long bristles.

c not projecting beyond r4+s. r2+3 ends half way between r1 and r4+s. fcu under r-m. an ends under fcu. Stout false veins along the cu-veins. Weaker false veins along an and the distal part of m.

**Legs:** L.R.(P1)=1.24-1.38. L.R.(P11)=0.48-0.55 (cf. Tab. 1). Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender. Pulvilli small (fig. 45). Ta1 of P11 with 2-3 hook-shaped bristles on distal  $\frac{2}{25}$ - $\frac{1}{10}$ .

**Hypopygium** (figs 2, 39): Anal tergite with lateral teeth of small to medium size and 2-4 bristles in median part. Anal tergal bands separated, parallel from the basal part of the

tergite to the anal point crests. Anal point crests (cf. fig. 34) poorly developed, in lateral view little or not at all projecting (cf. fig. 27). Anal tergite without hump in front of the anal point crests. Anal point acute with 5-9 lateral bristles on each side.

Appendage 1 parallel at base, its distal part broadly pointed. Dorsal with 5-8 bristles and 2-3 bristles at tip. On the basal part with a few microtrichia in a median position or with a more lateral position.

Appendage 1 a long and slender, its tip reaching beyond that of appendage 1.

Appendage 2 distal with parallel margins. On the middle part with a transverse ridge. From this to tip with long curved bristles.

Appendage 2 a long and slender (50-75  $\mu$ m. cf. Tab. 1 and fig. 38). On distal part with spoon-shaped lamellar bristles.

Dististyle slender, its distal part transversely cut.

|                           | Wing length<br>mm | A.R.      | LR(P <sub>I</sub> ) | LR(P <sub>II</sub> ) | 2a<br>μm |
|---------------------------|-------------------|-----------|---------------------|----------------------|----------|
| Total, n=92               | 2.6-3.5           | 1.30-1.56 | 1.24-1.38           | 0.48-0.55            | 50-75    |
| Finland, Kilpisjärvi n=20 | 2.8-3.1           | 1.30-1.56 | 1.24-1.34           | 0.49-0.54            | 59-72    |
| Finland, Inarijärvi n=10  | 3.0-3.3           | 1.39-1.58 | 1.29-1.33           | 0.51-0.54            | 59-73    |
| Finland, Puruvesi n=4     | 2.6-2.8           | 1.34-1.50 | 1.29-1.35           | 0.51-0.54            | 54-64    |
| Germany, Stechlinsee n=11 | 3.0-3.5           | 1.41-1.57 | 1.26-1.35           | 0.48-0.51            | 50-69    |

Table 1. *Microsepectra lindebergi*. Wing length, values of A.R., L.R.(P<sub>I</sub>), L.R.(P<sub>II</sub>) and length of appendage 2a for the total number of individuals studied and four local populations.

IMAGO FEMALE: Unknown

PUPA: Length: 4.6-5.4 mm.

**Colour:** Exuviae transparent except for the margins of wing and leg sheaths, the light brownish cephalothorax, the muscle patches, narrow stripes along the margins of tergites VII and VIII, the caudo-lateral combs of segment VIII and the posterior edges of tergite IX.

**Cephalothorax:** Frontal tubercles small, each with a long hair. Thoracic horn 680 μm, apically pointed. The outer lateral margin covered with long bristles on the apical 2/3. The apical 1/2 of inner lateral margin with long bristles. Bristles about 1/5-1/6 of length of thoracic horn.

**Chaetotaxy of thorax:** On both sides 6 oral thoracic hairs (Oth<sub>1-6</sub>). Oth<sub>1-3</sub> are situated in front of and slightly ventral of the thoracic horn. Oth<sub>4</sub> is situated in the median part of the prothoracic region. Oth<sub>5-6</sub> are situated close together at the base of the P<sub>I</sub> sheaths. 4 meta-thoracic hairs (Mth<sub>1-4</sub>) present and situated in two groups widely separated from each other. Mth<sub>1-2</sub> are situated half way between the base of the thoracic horn and the anterior part of the base of the wing sheaths and near the thoracic suture. Mth<sub>3-4</sub> are situated above the anterior part of the base of the wing sheaths, near the thoracic suture.

**Abdomen** (fig. 14): Tergite I without shagreenation. Tergite II with a row of anteriorly bent hooks, which covers about 1/2 of the segment width. Pseudopods on the same segment. The shagreenation covers the whole tergite except a field on the anterior part, the area immediately median of the muscle patches to the edge of the tergite and an anal-median patch. Tergite III with two fields of long spinules which are surrounded by shagreenation. Tergite IV with two fields of short spinules, posterior to each field a patch of shagreenation. Tergite V with two fields of short spinules, posterior to each field a patch of shagreenation. Shagreenation on this tergite shorter than on tergite IV.

Tergite VI with two separated bands of shagreenation, the anterior part of each band broader than the posterior. Tergite VII with or without weak shagreenation in the anterior part. Tergite VIII with two fields of shagreenation in the anterior part of the tergite immediately lateral of the muscle patches. Caudo-lateral combs of segment VIII with a simple row of about 6 coarse spines. Anal lobe with a simple row of 42-52 filamentous hairs.

Chaetotaxy of abdomen:

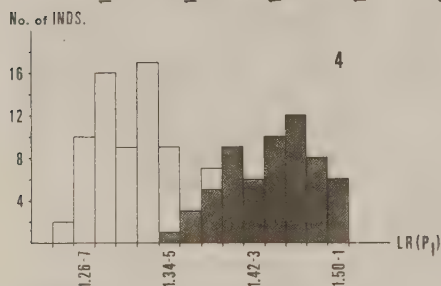
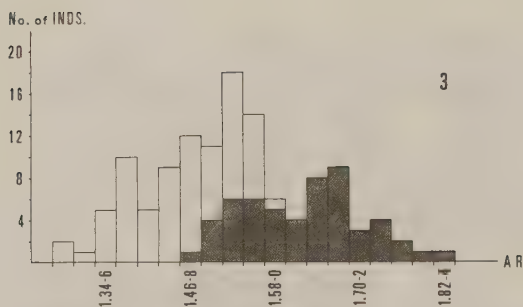
|    | I | II | III | IV | V | VI | VII | VIII | IX |
|----|---|----|-----|----|---|----|-----|------|----|
| D  | 3 | 3  | 5   | 5  | 5 | 5  | 5   | 1    | 1  |
| L  | - | 3  | 3   | -  | - | -  | -   | -    | -  |
| LS | - | -  | -   | 3  | 3 | 4  | 4   | 5    | -  |
| V  | 1 | 4  | 4   | 4  | 4 | ?  | ?   | 1    | -  |

O-bristles on sternite II-VII (?) (VIII).

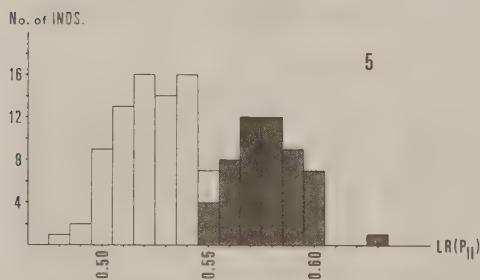
#### Taxonomic remarks

The ♂♂ of *M. lindebergi* (and *M. insignilobus*) differ from the other members of this group by the poorly or undeveloped anal point crests and in the shape of the anal point which is short and acute. *M. lindebergi* differs from *M. insignilobus* in the values of A.R., L.R.(P<sub>I</sub>) and above all in the value of L.R.(P<sub>II</sub>) and in the shape of appendage 2a. L.R.(P<sub>II</sub>) = 0.48-0.55 against 0.55-0.63 in *M. insignilobus*. Appendage 2a more slender and on average longer (50-75 μm against 40-59 μm) than in *M. insignilobus* (cf. figs 3, 4, 5, 38, 39).

The pupa differs from the other members of this group (except *M. insignilobus* and *M. lindrothi*) by having 3 LS-hairs on segment IV. *M. lindebergi* (and *M. insignilobus*) differs from *M. lindrothi* in the shape of the thoracic horn and in having narrow caudo-lateral combs of segment VIII with rather coarse spines. The only morphological difference found between *M. lindebergi* and *M. insignilobus* is the number of filamentous hairs on the anal lobe (42-52 against 53-60 by *M. insignilobus*). Since only a small number of pupae have been available



Figs 3-5. *Micropsectra lindebergi* (white) and *M. insignilobus* (grey). Values of A.R., L.R.(Pi) and L.R. (Pii) for total material examined.



for study this difference cannot be regarded as fully diagnostic.

The presence of a species morphologically very similar to *M. insignilobus* was indicated when Lindeberg (1970: 307) found differences in A.R., L.R.(Pi), and minor ones in the hypopygia between two sympatric and synchronous populations in Lake Kilpisjärvi (Tab. 2). The study of a larger material from Finland, Germany and Sweden has shown that the most marked difference between the two forms is found in the value of L.R.(Pii) (cf. figs 3, 4, 5) and the shape of appendage 2a in the hypo-

pygium. Since the two forms are sympatric they must be regarded as distinct species.

#### Ecology

*M. lindebergi* is known from ultra-oligotrophic (Lake Kilpisjärvi), oligotrophic (Lake Puruvesi, Lake Stechlinsee, Lake Vättern) and extreme oligohumic lakes (Lake Stora Blåsjön).

#### General distribution

Finland, Germany and Sweden.

## 2. *Micropsectra insignilobus* Kieffer (Figs 3-7, 27, 34, 38)

*Micropsectra insignilobus* Kieffer, 1924, pp. 85-86.

*Type locality*: Norway, Målsjön, Klaebu.

*Type material*: 1 ♂, labelled "Norway. Målsjön, Klaebu, 20.V.1972, leg. J.O. Solem and K. Aagaard. Klekkfelle 9 m", designated as neotype by me (cf. p.139). The neotype, mounted on microscopic slide in Euparal, in coll. LUZI.

*Additional material studied*: Finland: Le. Lake Kilpisjärvi, 16 ♂♂ 28.VI.1968, leg. B. Lindeberg; 3 ♂♂ (with pupal exuviae) 22.VI.1969, leg. L. Paasivirta. - Sa. Lake Puruvesi, 2 ♂♂ 16.V.1960, 2 ♂♂ 25-27.V.1961, 6 ♂♂ 17.V.1964, leg. B. Lindeberg. Norway: Fv. Alta, 12 ♂♂ 30.VI.1968; Hammerfest, 5 ♂♂ 1.VII.1968, leg. B. Lindeberg. - TRy. Mettevoll, 4 ♂♂ 29.VI.1968, leg. B. Lindeberg. - STi. Målsjön, Klaebu, 1 ♂ (with pupal exuvium) 20.V.1971, 2 ♀♀ (one with pupal exuvium) 1 ♂ 29.V.1971, 1 ♂ 12-19.V.1972, 2 ♂♂ 20.V.1972, 1 ♂ 26.VI.1972, leg. J.O. Solem and K. Aagaard. Sweden: Sm. Lake Skären, 2 ♂♂ 7.V.1946. - Sdm. Lake Mälaren, Sotholmen, 4 ♂♂ 20.V.1946; Lake Mälaren, Svartsjölandet, Eldgarn, 2 ♂♂ 29.V.1955, leg. L. Brundin; Lake Mälaren, N. Björkfjärden, 8 ♂♂ 4.V.1972, leg. T. Wiederholm. - Vstm. Lake V. Skålsjön, 1 ♂ 7.V.1973, 1 ♂ 17.V.1973, leg. P. Mossberg. - Jtl. Lake Torrön, 1 ♂ 14.VI.1946; Lake Kallsjön, Sulviken, 1 ♂ 14.VI.1946. - T.Lpm. Lake Katterjaure, 4 ♂♂ 14.VII.1952, leg. L. Brundin.

### Description

IMAGO MALE: *Wing length*: 2.7-3.4 mm.

*Colour*: Thorax all black. Legs and abdomen blackish brown.

*Head*: Frontal tubercles small. A.R.=1.47-1.83 (cf. Tab. 3).

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealars 2-3. Scutellars in one row.

*Wing*: Macrotrichia on distal  $\frac{3}{4}$  of wing. The fields between c and r+s and the field caudal of an are free from macrotrichia. All veins except sc, r<sub>2+3</sub>, the basal  $\frac{1}{2}$  of r+s and m from base to cross-vein r-m with macrotrichia. Stem vein with 2 long bristles.

Venation as by *M. lindebergi*.

*Legs*: L.R.(Pi)=1.34-1.51. L.R.(PiI)=0.55-0.63 (cf. Tab. 3). Front tibia with short spur.

Combs of middle and hind tibia fused. Claws slender. Pulvilli small (cf. fig. 45). Ta<sub>1</sub> of PiI with 2-4 hook-shaped bristles on distal 1/10-1/6.

*Hypopygium* (figs 27, 34, 38): Anal tergite with small lateral teeth. Anal tergal bands widely separated, parallel from the basal part of the tergite to the anal point crests. Anal point crests reduced or poorly developed (figs 27, 34). Anal tergite with 2-5 bristles in median part. Anal point acute with 2-4 lateral bristles on each side.

Appendage 1 parallel at base, its distal part pointed and bent in median direction. Dorsal with 7-9 bristles and 2-3 bristles at tip. On the basal part with a few microtrichia in a median or latero-median position. The outer edge of the appendage with a few microtrichia.

Appendage 1a long and slender, its tip reaching beyond that of appendage 1.

Appendage 2 with a transverse ridge on the middle part. The distal part of the appendage with almost parallel margins.

Appendage 2a rather short and compact (40-59  $\mu$ m. Tab. 3 and fig. 38). On distal part with spoon-shaped lamellar bristles, basally with long simple bristles.

Dististyle slender, towards tip not gradually narrowing. Tip rounded.

IMAGO FEMALE: *Wing length*: 2.94-2.95 mm.

*Colour*: Similar to the ♂.

*Head*: Instead of frontal tubercles a broad chitinated ridge. Antenna with 6 flagellomeres, the first and second are fused together. Flagellomere 1 with 3-4 and flagellomeres 2-5 with 5-7 long bristles. Flagellomere 6 without (?) long bristles. The thin distal part of flagellomeres 2-5 with 2 hyaline sensory bristles. Flagellomere 1 with 1 short sensory bristle and flagellomere 6 with about 16 sensory bristles.

*Length of flagellomeres 1-6 in  $\mu$ m (n=1)*:

|         |    |    |    |     |
|---------|----|----|----|-----|
| 1 and 2 | 3  | 4  | 5  | 6   |
| 123     | 67 | 87 | 87 | 154 |

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals reach antepronotum in one row. Prealars 1-2. sc in one row.

|                             | Wing length<br>mm | A.R.      | L.R.(Pi)  | L.R.(PiI) | 2a<br>$\mu$ m |
|-----------------------------|-------------------|-----------|-----------|-----------|---------------|
| <i>M. lindebergi</i> n=20   | 2.8-3.1           | 1.30-1.56 | 1.24-1.34 | 0.49-0.54 | 59-72         |
| <i>M. insignilobus</i> n=16 | 2.9-3.2           | 1.57-1.83 | 1.34-1.51 | 0.55-0.60 | 49-57         |

Table 2. Wing length, values of A.R., L.R.(Pi), L.R.(PiI) and length of appendage 2a for two sympatric and synchronous populations (Finland, Lake Kilpisjärvi, 28.VI.1968) of *Micropsectra lindebergi* and *M. insignilobus*.

|                           | Wing length<br>mm | A.R.      | LR(P <sub>I</sub> ) | LR(P <sub>II</sub> ) | 2a<br>μm |
|---------------------------|-------------------|-----------|---------------------|----------------------|----------|
| Total, n=81               | 2.7-3.4           | 1.47-1.83 | 1.34-1.51           | 0.55-0.63            | 40-59    |
| Finland, Kilpisjärvi n=16 | 2.9-3.2           | 1.57-1.83 | 1.34-1.51           | 0.55-0.60            | 49-57    |
| Finland, Puruvesi n=6     | 2.7-3.0           | 1.47-1.67 | 1.36-1.51           | 0.56-0.60            | 44-59    |
| Norway, Alta n=12         | 2.8-3.4           | 1.51-1.78 | 1.37-1.49           | 0.56-0.60            | 47-57    |
| Sweden, Mälaren n=8       | 2.9-3.1           | 1.57-1.67 | 1.39-1.49           | 0.57-0.60            | 42-53    |

Table 3. *Micropsectra insignilobus*. Wing length, values of A.R., L.R.(P<sub>I</sub>), L.R.(P<sub>II</sub>) and length of appendage 2a for the total number of individuals studied and four local populations.

**Wing:** More densely covered with macrotrichia than the ♂. The fields between c and r<sub>4+5</sub> are free from macrotrichia. All veins except for m basal of cross-vein r-m with macrotrichia.

Venation similar to the ♂.

**Legs:** L.R.(P<sub>I</sub>)=1.34-1.35. L.R.(P<sub>II</sub>)=0.54-0.58. Claws and tibial combs as in the ♂. T<sub>AI</sub> of P<sub>II</sub> with 19-20 hook-shaped bristles on distal 3/4.

**Apex of abdomen** (fig. 6): Postgenital plate triangular in ventral view. Cerci as in fig. 6, 99 μm long. 2 sub-oval spermathecae present. Dorsomesal and ventrolateral lobes of gonapophysis VIII clearly separated from each other. At base of dorsomesal lobe a group of differentiated bristles. Median margin of ventrolateral lobe with a weak fringe of longer bristles, the length of which increases in apical direction.

**PUPA:** Morphologically very similar to *M. lindebergi* n.sp. Differs from that species in having 53-60 filamentous bristles on the anal lobe. Thoracic horn fig. 7.

#### Taxonomic remarks

The diagnostic characters of the pupae and ♂♂ of *M. insignilobus* are given in the taxonomic remarks by *M. lindebergi*. The ♀♀ differ from the other known females of this group in having only 20 hook-shaped bristles on T<sub>AI</sub> of P<sub>II</sub> and very slender coxosternapodemes.

The original type material of this species is lost. The description of the pupa of *M. insignilobus* given by Lenz (1927: 183-185) can be applied to both *M. insignilobus* sensu meo, and *M. lindebergi*. Since *M. lindebergi* is not known from Norway I have chosen to apply the name *M. insignilobus* to the species known to occur in Norway.

#### Ecology

*M. insignilobus* is known from ultra-oligotrophic (Lake Kilpisjärvi) and oligohumic lakes (Lake V. Skälsjön, Lake Skären). In Lake Mälaren the species is found in areas with moderately oligotrophic conditions. J. O. Solem and K.

Ågaard found specimens hatching from depths of 7-9 m in Lake Mälarsjön, Norway.

Wiederholm (1974: 44-45) found larvae of a *Micropsectra* species in the central part of Lake Mälaren. The imagines caught in these localities were published under the name *M. praecox* (Meig.). They actually belong to *M. insignilobus*. According to Wiederholm the presence in the central parts of Lake Mälaren indicates a stenoxymbiotic adaptation.

#### General distribution

Finland, Norway and Sweden.

#### 3. *Micropsectra lindrothi* Goetghebuer

(Figs 1, 8, 9, 28)

*Micropsectra lindrothi* Goetghebuer, 1931, pp. 278-280.

*Micropsectra foliata* Laville, 1965, pp. 73-81. N.syn.

**Type locality:** North Iceland, Skútustadir, south side of Lake Mývatn.

**Holotype:** 1 ♂ labelled "*Micropsectra lindrothi* n.sp.", "173", "Type ♂ *M. Goetghebuer*" in coll. NMG.

**Additional material studied:** France: Hautes-Pyrénées, Massif du Néouvielle, Lac Aumar, 2 ♂♂ 24.VIII.1964; Hautes-Pyrénées, Massif du Néouvielle, "Laquette", 1 ♂ and 1 ♀ 22.VIII.1963; Camargue, 8 ♂♂ 12.III.1966; Camargue, Clos des Faisses, 2 ♂♂ 12.IX.1966; Pyrénées, Lac Supérieur d'Estibère, 1 ♀ (with pupal exuvium) 22.IX.1965, leg. H. Laville. Germany: Holstein, Plön, 2 ♂♂ July (?) 1929, leg. A. Thienemann. Oberhündem, 1 ♂ 20.VI.1953, leg. H. Dittmar. Fulda, Erlenuwald, 1 ♂ 12.XI.1952; Wasserkuppe, 1 ♂ 10.VIII.1953, 1 ♀ 24.XII.1953, 1 ♂ XII.1953, leg. E. J. Fittkau. Sipplingen, Dorfbrunnen, 1 ♂ 14.X.1965; Sipplingen, Brunnen, 1 ♂ (with pupal exuvium) 1.XI.1965, leg. F. Reiss. Frankfurt/Main, 1 ♂ 8.V.1975, leg. I. Rademacher. Greenland: Angmassalik, 1 ♂ 27.VIII.1970, leg. G. Bretschko. Iceland: 50 km West Reykjavik, 2 ♂ 28.VII.1970, 1 ♂ 27.VIII.1970, leg. G. Bretschko. Thjórsárver, 3 ♂♂ 9.VII.1972; Surtsey, 2 ♂♂ 12.VIII.1970, leg. E. Olafsson. Sweden: Sm. Lake Trummen, 5 ♂♂ 2.V.1946, leg. L. Brundin. USSR: Georgian SSR, Great Caucasus, Kazbek Region, Suatis Stream, 2 ♂♂ 25.VII.1970; Georgian SSR, Great Caucasus, Svaneti Region, Dolsa Stream, 9.VIII.1970, leg. A. Kownacki.

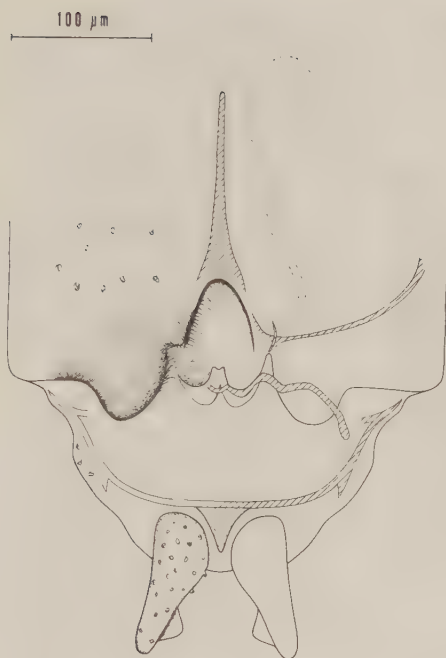


Fig. 6. *Micropectra insignilobus*. Apex of female abdomen. Ventral view.

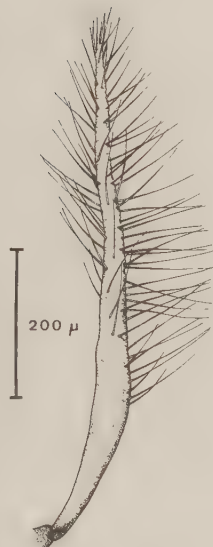


Fig. 7. *Micropectra insignilobus*. Thoracic horn of pupa. Dorsal view. (del. L. Brundin).

# Description

IMAGO MALE: *Wing length*: 2.13–3.72 mm.

*Colour*: Sternum, coxae, mesonotal stripes and scutellum dark brown. The other parts of thorax lighter brown. Legs and abdomen brown.

*Head*: Frontal tubercles small. A.R.=1.05–1.60.

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealar 3–5. Scutellars in one row.

*Wing*: Covered with macrotrichia except at base. The fields between *c* and *r*<sub>4+5</sub>, a broad patch along *an* and the basal half of *m* are free from macrotrichia. All veins except *sc*, *r*<sub>2+3</sub>, *m* from cross-vein *r-m* to base and the basal 1/2 of *cu* with macrotrichia. Stem vein with 2–3 long bristles.

Venation similar to *M. lindebergi*.

*Legs*: L.R.(P<sub>1</sub>)=1.52–1.63. L.R.(P<sub>11</sub>)=0.60–0.65. Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender. Pulvilli small. Ta<sub>1</sub> of P<sub>11</sub> with 6–20 hook-shaped bristles on distal 1/7–1/4.

*Hypopygium* (figs 8, 28): Anal tergite with lateral teeth of medium size and 5–10 bristles in median part. Anal tergal bands separated. Anal point crests (fig. 28) poorly developed, in lateral view little or not at all projecting. Anal tergite without hump in front of the anal point crests. Anal point short with rounded tip.

Appendage 1 finger-shaped and in middle part sharply bent in median direction. Dorsal with 5–8 bristles and 2–3 bristles at tip. On the basal part with a group of microtrichia in a median position.

Appendage 1 a long and slender, its tip pointed and reaching beyond that of appendage 1.



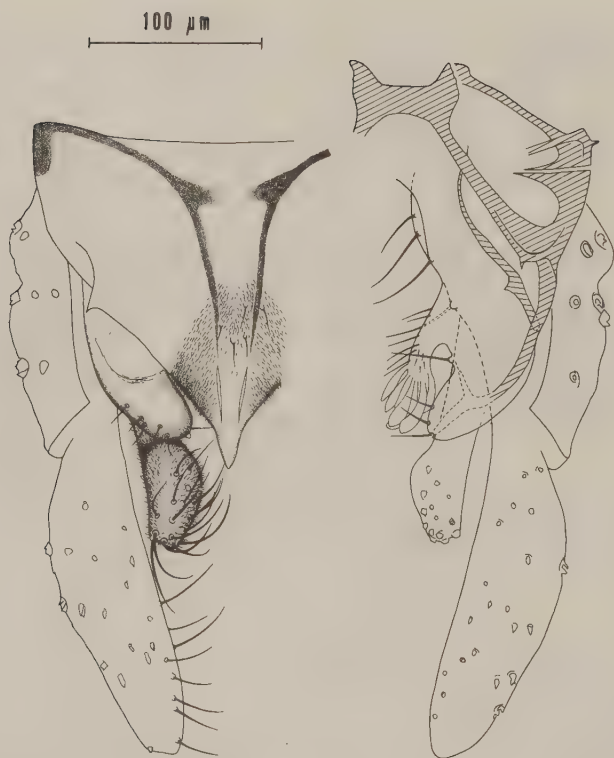


Fig. 8. *Micropsectra lindrothi*. Hypopygium. Dorsal view.

Appendage 2 with tip forming a ball-shaped swelling. The lateral margin of the appendage concave and the outer part of the median margin convex.

Appendage 2a short (23–31 μm). At tip with leaf-shaped lamellar bristles, basally with long simple bristles on median part.

Dististyle at tip broadly rounded.

**IMAGO FEMALE:** *Wing length:* 2.56–2.69 mm.

*Colour:* Similar to the ♂.

*Head:* Instead of frontal tubercles a broad chitinized ridge. Antenna with 6 flagellomeres, the first and second are fused together. Flagello-

mere 1 with 3 and flagellomeres 2–5 with 5–7 long bristles. Flagellomere 6 with 1 long bristle at tip. The thin distal parts of flagellomeres 2–5 with 2 hyalin sensory bristles. Flagellomere 1 with 1 short sensory bristle and flagellomere 6 with about 20 sensory bristles.

*Length of flagellomeres 1–6 in μm (n=1):*

|         |    |    |    |     |
|---------|----|----|----|-----|
| 1 and 2 | 3  | 4  | 5  | 6   |
| 116     | 75 | 87 | 91 | 176 |

*Thorax:* Acrostichals reach anteprepronotum. Dorsocentrals reach anteprepronotum in one irregular row. Prealars 2–3. sc in one row.

*Wing:* More densely covered with macro-

trichia than by the ♂. The fields between c and r+s are free from macrotrichia. All veins except sc and the basal part of m covered with macrotrichia. Stem vein with 2 long bristles.

*Legs:* L.R.(P<sub>I</sub>)=1.53. L.R.(P<sub>II</sub>)=0.56. Claws and tibial combs as in the ♂. Ta<sub>1</sub> of P<sub>II</sub> with 67–68 hook-shaped bristles on distal  $\frac{1}{5}$ .

*Apex of abdomen* (fig. 9): Postgenital plate small, triangular in ventral view. Cerci as in fig. 9, 111  $\mu$ m long. 2 sub-oval spermathecae present. Dorsomesal and ventrolateral lobes of gonapophysis VIII divided from each other. Dorsomesal lobe rounded and surrounded by a membrane. Bristles on ventrolateral lobe longer towards margin, on median part gradually forming a fringe of long bristles. Ventrolateral lobe relatively weak developed.

*PUPA:* Length: 5.6–6.0 mm.

*Colour:* Exuvia transparent except for the margins of wing and leg sheaths, the light brownish cephalothorax, the muscle patches, narrow stripes along the margins of tergite IX and the caudo-lateral combs of segment VIII.

*Cephalothorax:* Frontal tubercles small, each with a long bristle. Thoracic horn 450  $\mu$ m, apically pointed. The outer lateral margin covered with long bristles except for the most basal part. The apical  $\frac{1}{2}$  of inner lateral margin covered with long bristles. Bristles about  $\frac{2}{5}$ – $\frac{1}{3}$  of length of thoracic horn.

*Chaetotaxy of thorax:* Similar to *M. lindebergi*.

*Abdomen:* Tergite I without shagreenation. Tergite II with a row of anteriorly bent hooks which covers about  $\frac{1}{2}$  of the segment width. Pseudopods on the same segment. The shagreenation covers the whole tergite except a field on the anterior part, the area lateral of the muscle patches to the edge of the tergite, a U-shaped area median to the muscle patches in the middle of the tergite and an anal-median patch. Tergite III with two fields of long spinules which are surrounded by shagreenation. Tergite IV with two fields of short spinules, from each field a patch of shagreenation in posterior direction. Tergite V with two fields of short spinules. In posterior direction from each field a patch of shagreenation. Tergite VI with two separated bands of shagreenation close to the median line. Tergite VII with or without weak shagreenation in the anterior part. Tergite VIII without shagreenation. Margins of caudo-lateral combs with a simple row of about 7 spines. On dorsal part with a number of spines. Anal lobe with 43–56 filamentous hairs.

*Chaetotaxy of abdomen:*

|    | I | II | III | IV | V | VI | VII | VIII | IX |
|----|---|----|-----|----|---|----|-----|------|----|
| D  | 3 | 3  | 5   | 5  | 5 | 5  | 5   | 1    | 1  |
| L  | – | 3  | 3   | –  | – | –  | –   | –    | –  |
| LS | – | –  | –   | 3  | 3 | 4  | 4   | 5    | –  |
| V  | – | 4  | 4   | 4  | 4 | 4  | 4   | 1    | –  |

O-bristles on sternite II–IX.

#### *Taxonomic remarks*

The ♂♂ of *M. lindrothi* are characterized by the short appendage 2a which has leaf-shaped bristles at tip.

The ♀♀ differ from the other known ♀♀ of this group by having a small postgenital plate and in the shape of the ventrolateral lobe of gonapophysis VIII. The number of hook-shaped bristles on Ta<sub>1</sub> of P<sub>II</sub> (67–68) higher than in the other known species.

The pupa differs from the other members of this group (except *M. insignilobus* and *M. lindebergi*) by having 3 LS on segment IV. *M. lindrothi* differs from *M. insignilobus* and *M. lindebergi* in the shape of the thoracic horn (bristles on thoracic horn about  $\frac{2}{5}$ – $\frac{1}{3}$  of length of thoracic horn against  $\frac{1}{5}$ – $\frac{1}{6}$  in the other two species) and in having broader caudo-lateral combs of segment VIII with finer spines.

#### *Ecology*

*M. lindrothi* is a crenophilic species known from helocrenic and limnocrenic springs and the epirithral zone of streams. The species prefers shallow water with low temperature and a bottom substrate rich in organic material. In Germany, Wasserkuppe, the species is known from helocrenic springs and the epirithral zone of streams together with *M. roseiventris*, *M. junci* and *M. recurvata* (Fittkau in litt.). At Sippelingen/Lake of Konstanz the species has been found in the man-made basin of a limnocrenic spring. According to Tourenq (1975), who studied the species in Camargue, France, the larval development takes place during November to May at water temperatures below 10°C. Laville (1971: 265) found the species in a shallow bay of Lac Vert in the Pyrenees. The bay was extremely rich in detritus. The species was found to hatch from September to the end of October (op. cit. p. 266 and fig. 14).

*M. lindrothi* seems to be rather common and has a wide distribution in North-West Europe. In other parts of its range it is rather rare, probably depending on the stenotopic ecology of the species and the fact that optimal biotopes for

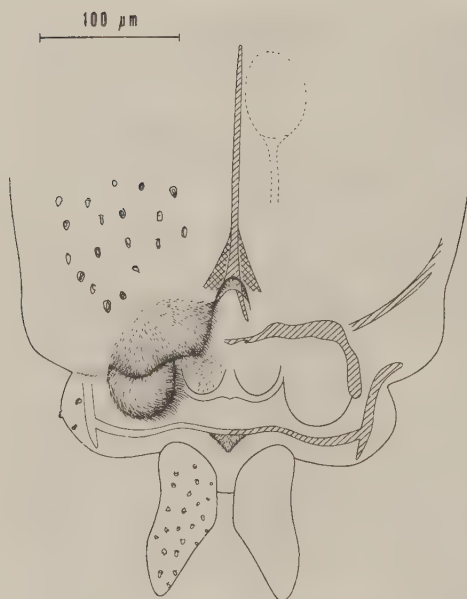


Fig. 9. *Micropsectra lindrothi*. Apex of female abdomen. Ventral view.

the species are sparse outside North-West Europe.

#### General distribution

France, Germany, Greenland, Iceland, Sweden and USSR.

#### 4. *Micropsectra notescens* (Walker)

(Figs 10-13, 15, 19, 29, 42)

*Chironomus notescens* Walker, 1856, pp. 156-157.

*Micropsectra praecox* auctt. (nec Wiedemann in Meigen, 1818). N.syn.

*Chironomus occipiens* Walker, 1856, p. 165. N.syn.

*Chironomus nactus* Walker, 1856, pp. 179-180.

N.syn.

*Chironomus offectus* Walker, 1856, p. 185. N.syn.

*Tanytarsus* (*Micropsectra*) *inermipes* Kieffer,

1909, pp. 50-51. N.syn.

*Tanytarsus* (*Calopsectra*) *insularis* Kieffer, 1911,

pp. 49-50. N.syn.

*Tanytarsus* (*Tanytarsus*) *hemipisilus* Kieffer, 1911,

pp. 51-52. N.syn.

*Tanytarsus* (*Micropsectra*) *tetratomus* Kieffer,

1911, pp. 57-58. N.syn.

*Tanytarsus* (*Tetratanytarsus*) *bifilis* Kieffer, 1922,

p. 125. N.syn.

Type area: England.

Type material: 1 pinned ♂ (lectotype, cf. p.143) labelled "Type. *Chironomus notescens* Wlk.", "Pres. by F. Walker 56-50." and one handwritten label bearing the word "notescens".

Additional material studied: Czechoslovakia: Moravia, Moravský potok u Bya skaly, 1 ♂ 22.IV.1969, leg. Knoz. Denmark: Ravnkilde, 2 ♂♂ 12.V.1970, 2 ♂♂ 24.V.1971, leg. C. Lindegaard. Germany: Fulda, 1 A (cf. Lehmann 1971, p. 470), 1 ♂ 11.IX.1951, 1 ♂ 3.X.1951, 9 ♂♂ III.1952, 31 ♂♂ IV.1952, 6 ♂♂ V.1952, 1 ♂ 23.VII.1952, 1 ♂ 25.VIII.1952, 5 ♂♂ and 9 Pe IX.1952, 3 ♂♂ and 4 Pe 13.IX.1952, 1 Pe 1.X.1952, 1 ♂ 3.X.1952, 1 Pe 5.X.1952, 14 Pe X.1952, 3 ♂♂ 12.XI.1952, 14 ♂♂ 1953, 1 ♂ V.1953, leg. E. J. Fittkau. Fulda, 2 B (cf. Lehmann 1971, p. 470), 2 ♂♂ (one with pupal exuvium) 27.VIII.1952, 6 ♂♂ 28.IV.1952, 1 ♂ (with pupal exuvium) 20.VII.1952, 1 ♂ (with pupal exuvium) 15.XI.1952, 3 ♂♂ 12.VIII.1953, 3 ♂♂ and 1 Pe 19.VIII.1953, 10 ♂♂ 22.VIII.1953, 26 ♂♂ (one with pupal exuvium) 27.VIII.1953, 4 ♂♂ 1.IX.1953, 2 ♂♂ (1 with pupal exuvium) 19.IX.1953, 7 ♂♂ 14.X.1953, 1 ♂ 21.X.1953, 2 ♂♂ 28.X.1953, 1 ♂ 15.III.1954, 1 ♂ and 6 Pe IV.1954, 1 ♂ 20.VII.1954, leg. E. J. Fittkau. Wasserkuppe/Rhön, 1 ♂ 27.VIII.1953, 1 ♂ 28.VIII.1953, 1 ♂ 4.IX.1953, 1 ♂ 11.IX.1953, leg. E. J. Fittkau. Freiburg, 2 ♂♂ 23.V.1951, leg. Wülker. Bach am Vierersee, 1 ♂ and 2 Pe 30.III.1967, leg.

F. Reiss. Lake Bodensee, Wahlwies, 1 ♂ 9.IV.1966, leg. F. Reiss. Schleswig-Holstein, Lake Dieksee, 2 ♂♂ 22.IX.1975, leg. H.-H. Schmidt. Schleswig-Holstein, Lake Kellerssee, 3 ♂♂ and 1 ♀ (with pupal exuvium) 22.IX.1975, leg. H.-H. Schmidt. *Rumania*: Fogaras Mountains, 2 ♂♂ 4.VIII.1974, leg. Kownacki. *Sweden*: Sk. Blentarps, Stampenbäcken, 6 ♂♂ 8.V.1972, leg. L. Säwedal; Borstbäcken, 1 km N. Vombsjön, 1 ♂ (with larval skin and Pe) 5.VIII.1974, leg. L. Säwedal.

## Description

**IMAGO MALE:** *Wing length:* 2.44–3.26 mm.

*Colour:* Thorax black. Abdomen brown. A part of the material from Germany, Fulda, have a very marked, dark, subcutaneous pigmentation on the abdomen.

*Head:* Frontal tubercles small. A.R.=1.21–1.68.

*Thorax:* Acrostichals reach antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealars 2–4. Scutellars in one row.

*Wing:* Macrotrichia on whole wing except for the most basal part and the fields between c and r<sub>4+5</sub>. All veins except r-m, m basal of cross-vein r-m and the basal 1/2 of sc with macrotrichia. Stem vein with 2 long bristles.

*Venation* as by *M. lindebergi*.

*Legs:* L.R.(P<sub>1</sub>)=1.39–1.81. L.R.(P<sub>11</sub>)=0.56–0.63. Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender. Pulvilli small. Ta<sub>1</sub> of P<sub>11</sub> with 4–9 hook-shaped bristles on distal 1/9–1/6.

*Hypopygium* (figs. 10, 29, 42): Anal tergite with lateral teeth. Anal tergal bands separated. Anal tergite in median part with 2–3 bristles. Anal point crests short and of medium height (fig. 29). Anal tergite without or with a weak hump in front of the anal point crests. Anal point long and slender with 2–4 bristles basally on each side.

Appendage 1 finger-shaped, tip broadly rounded and bent in median direction. Dorsal with 5–7 bristles and 2 bristles at tip. On the basal part with a group of microtrichia in a median position on the dorsal side.

Appendage 1 a long and slender, its tip reaching beyond that of appendage 1.

Appendage 2 with tip forming a ball-shaped swelling.

Appendage 2a (fig. 42) short (38–64 μm). On distal part with spoon-shaped lamellar bristles. The distal extension gradually rising from stem. Basal with long simple bristles.

Dististyle stout, towards tip gradually narrowing.

**IMAGO FEMALE:** *Wing length:* 2.78 mm.

*Colour:* Similar to the male.

*Head:* Two broad sclerotized ridges with frontal tubercles standing on them present. Antenna with 6 flagellomeres, the first and second are fused. Flagellomeres 1–5 with 4–7 long bristles. Flagellomere 6 with 1 long bristle at tip. The thin distal part of flagellomeres 2–5 with 2 hyalin sensory bristles. Flagellomere 6 with 12 sensory bristles.

*Length of flagellomeres 1–6 in μm (n=1):*

| 1 and 2 | 3  | 4  | 5  | 6   |
|---------|----|----|----|-----|
| 131     | 89 | 99 | 99 | 156 |

*Thorax:* Acrostichals reach antepronotum. Dorsocentrals reach antepronotum. Prealars 5. Scutellars in one row.

*Wing:* More densely covered with macrotrichia than by the ♂. The fields between c and r<sub>4+5</sub> are free from macrotrichia. All veins except m basal of cross-vein r-m densely covered with macrotrichia. m basal of cross-vein r-m with only 4–5 bristles. Stem vein with 4 long bristles.

*Legs:* L.R.(P<sub>1</sub>)=1.57. L.R.(P<sub>11</sub>)=0.54. Claws and tibial combs as in the ♂. Ta<sub>1</sub> of P<sub>11</sub> with 34 hook-shaped bristles on distal 7/10.

*Apex of abdomen* (fig. 11): Postgenital plate triangular in ventral view. Cerci 111 μm long. 2 suboval spermathecae present. Dorsomesal and ventrolateral lobes of gonapophysis VIII clearly divided from each other. At base of dorsomesal lobe a group of differentiated bristles arranged in about 10 rows. Dorsomesal lobe surrounded by a membrane. Bristles on ventrolateral lobe longer towards margin, gradually forming a fringe of long bristles on median margin.

**PUPA:** *Length:* 5.43–5.88 mm.

*Colour:* Exuvia transparent except for the margins of wing and leg sheaths, the light brownish cephalothorax, two light brownish fields on posterior part of tergite II, light brownish stripes along the margins of segment VI–IX, muscle patches, and the caudo-lateral combs of segment VIII.

*Cephalothorax:* Frontal tubercles well developed, each with a long bristle. Thoracic horn (fig. 12) 660 μm. Broad at base, towards tip gradually narrowing. Lateral margin covered with long bristles. Median margin on outer 2/3 with long bristles. Bristles about 1/4 of length of thoracic horn.

*Chaetotaxy of thorax* (fig. 13): Similar to *M. lindebergi*.



Fig. 10. *Micropsectra notescens*. Hypopygium. Dorsal view.

*Abdomen* (figs 15, 19): Tergite I without shagreenation. Tergite II with a row of anteriorly bent hooks, which covers about  $\frac{1}{2}$  of the segment width. Pseudopods on the same segment. The shagreenation covers the whole tergite except a field on the anterior part, the area lateral of the muscle patches to the margin of the tergite

and an anal-median patch. Tergite III with two fields of long spinules surrounded by shagreenation. The shagreenation ends median of the muscle patches except for an anterior stripe. Tergite IV with two fields of short spinules, from each field a stripe of shagreenation in posterior direction. Shagreenation of tergite V

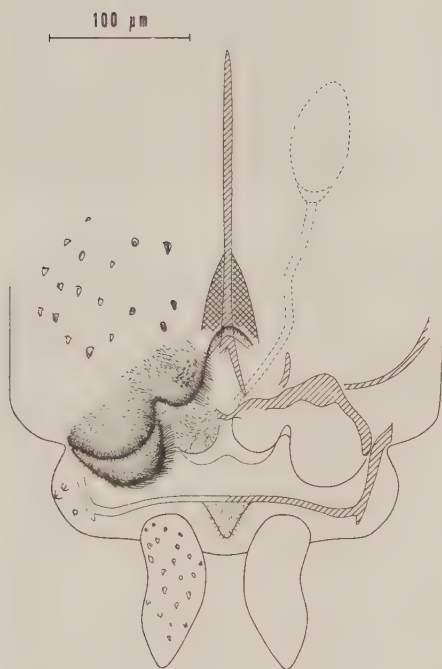


Fig. 11. *Micropsectra notescens*. Apex of female abdomen. Ventral view.



Fig. 12. *Micropsectra notescens*. Thoracic horn of pupa. Dorsal view. (del. L. Brundin).

similar to that of tergite IV. Tergite VI with two separated stripes of shagreenation. Tergite VII without shagreenation. Tergite VIII in the anterior part with two fields of shagreenation in lateral position. Margins of caudo-lateral combs of segment VIII with a row of about 6 spines. On dorsal part with a number of spines. Anal lobe with 42-57 filamentous hairs.

#### Chaetotaxy of abdomen:

|    | I | II  | III | IV | V | VI | VII | VIII | IX |
|----|---|-----|-----|----|---|----|-----|------|----|
| D  | 3 | 3-4 | 5   | 5  | 5 | 5  | 5   | 1    | 1  |
| L  | - | 3   | 3   | 1  | - | -  | -   | -    | -  |
| LS | - | -   | -   | 2  | 3 | 4  | 4   | 5    | -  |
| V  | - | 4   | 4   | 4  | 4 | 4  | 4   | 1    | -  |

O-bristles on sternite II-VIII.

#### Taxonomic remarks

The ♂♂ of *M. notescens* are characterized by the ball-shaped appendage 2 and the short appendage 2a with spoon-shaped lamellar bristles at tip.

The ♀♀ differ from those of *M. apposita* in the shape of the dorsomesal and ventrolateral lobes and in having longer marginal bristles on ventrolateral lobe. *M. notescens* differ from the ♀♀ of *M. contracta* in the shape of the ventrolateral lobe and in having fewer and not so distinct differentiated bristles at base of dorsomesal lobe.

The pupae differ from those of *M. insignilobus*, *M. lindebergi* and *M. lindrothi* in having 2 LS and 1 L-bristle on segment IV. *M. notescens*



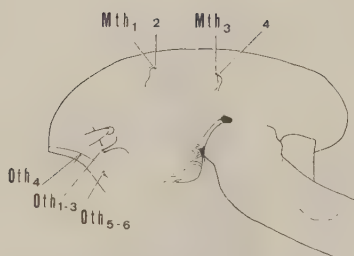


Fig. 13. *Micropsectra notescens*. Thorax of pupa. Lateral view. Mth<sub>1-4</sub>, metathoracic hairs; Oth<sub>1-6</sub>, oral thoracic hairs.

*scens* differ from *M. junci* in lacking the tubular structure in front of the wing sheaths. Fields of long and short spinules similar to *M. junci* but differ from *M. contracta* and *M. apposita* in not having a patch of rather long spinules in posterior direction from each of the fields with short spinules on tergite IV.

#### Ecology

A coldstenothermous, polyoxybiont species known from springs and the epirhithral zone of streams where it inhabits lentic places. In the central European mountains and down into the lowlands this species forms a characteristic community together with *M. junci* and some *Macropelopia*-species.

In the small South Swedish stream Borstbäcken larvae were found together with *M. apposita* in lentic parts of the stream.

#### General distribution

Czechoslovakia, Denmark, England, Germany, Rumania and Sweden.

#### 5. *Micropsectra contracta* Reiss

(Figs 17, 18, 20, 21, 40)

*Micropsectra contracta* Reiss, 1965, pp. 228-232.

*Type locality*: Germany, Lake Bodensee.

*Holotype*: 1 ♂ labelled "1.5.63, *Micropsectra contracta* n.sp. Bodensee." The holotype mounted on microscopic slide in Euparal is deposited in coll. Reiss, Plön, Germany. *Paratypes*: Switzerland, Vierwaldstättersee, Luzern, 1 ♂ and 3 ♀ 19.III.1959, leg. Wülker. Germany, Bodensee, 4 ♂♂ 9.IV.1962, 9 ♀ 19.IV.1962, 1 ♂ (with pupal exuvium) 7.V.1962, 1 ♂ (with pupal exuvium) 1.VI.1962, 9 ♀ 15.IX.1962, 1 ♂ 19.IX.1962, 8 ♂♂ and 10 mounted hypopygia

1963, 6 ♂♂ and 4 ♀♀ 1.V.1963, 13 ♀ 22.VII.1963, 3 ♂♂ 14.IX.1963, 2 ♂♂ and 3 mounted hypopygia 20.IX.1962, leg. F. Reiss; Bodensee, Süssenmühle, 1 ♂ 26.X.1962, leg. F. Reiss.

*Additional material studied*: France: Lac Gourguet, 4 ♀ 5.VII.1966, 1 ♀ 14.VII.1965, leg. H. Laville; Lac de l'île, 1 ♀ 29.VI.1965, 1 ♀ 16.VII.1965, leg. H. Laville. Germany: Bodensee, 2 ♂♂ 8.V.1962, leg. F. Reiss; Bodensee, Sipplingen, 11 ♂♂ 31.X.1964, leg. F. Reiss; Walensee, 1 ♂ 23.IV.1965, leg. H. Müller. Switzerland: Interlaken, 2 ♂♂ 10.VIII.1956, leg. Clastrier.

#### Description

IMAGO MALE: *Wing length*: 2.39-3.74 mm.

*Colour*: Thorax blackish brown, pleura somewhat more lightly coloured. Abdomen dark brown. Head and legs brown. Halteres light brown.

*Head*: Frontal tubercles small. A.R.=1.34-1.83.

*Thorax*: Acrostichals reach anteprepronotum. Dorsocentrals end between scutellum and anteprepronotum. Prealaris 2-3. Scutellars in one row.

*Wing*: Macrotrichia on whole wing except for the most basal part. The fields between c and r<sub>4+5</sub> and a broad patch along an and cu are free from macrotrichia. All veins except the basal 1/2 of sc and the basal 1/2 of m covered with macrotrichia. Stem vein with 2 long bristles.

Venation similar to *M. lindebergi*.

*Legs*: L.R.(P<sub>I</sub>)=1.38-1.68. L.R.(P<sub>II</sub>)=0.57-0.68. Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender. Pulvilli small. Ta<sub>1</sub> of P<sub>II</sub> with 4-11 hook-shaped bristles on distal 1/10-2/5.

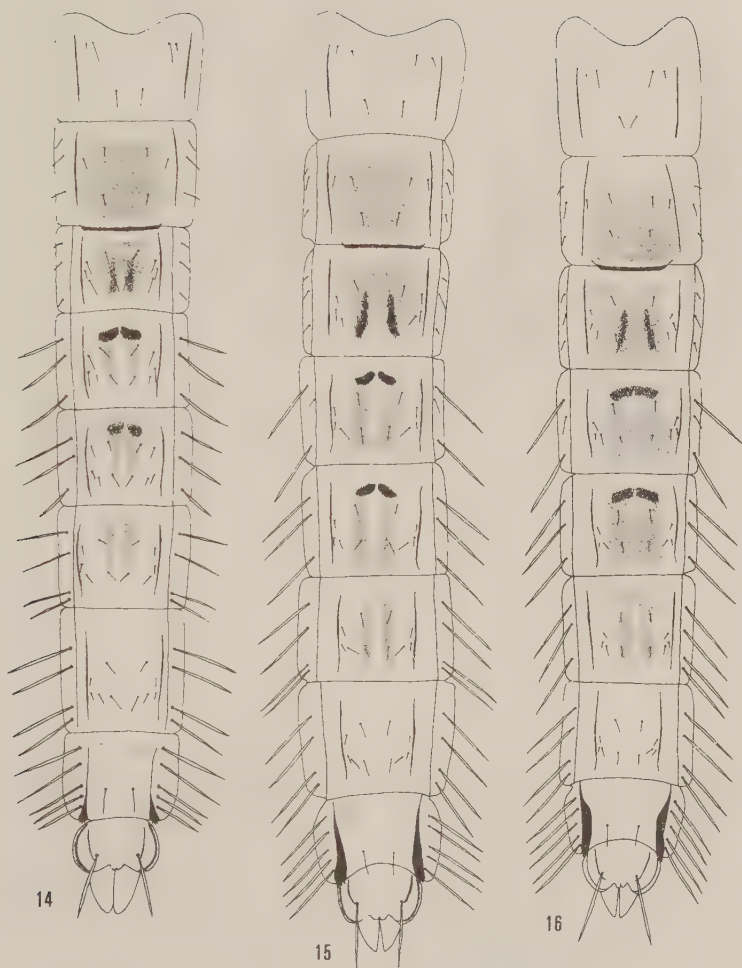
*Hypopygium* (figs 17, 40): Anal tergite with lateral teeth of medium size and 2-6 bristles in median part. Anal tergal bands separated. Anal point crests (cf. fig. 30) of medium height. Anal tergite with or without a weak hump in front of the anal point crests. Anal point with 2-5 lateral bristles on each side.

Appendage 1 triangular and bent in median direction. Dorsal with 5-6 bristles and 2-3 bristles at tip. On the basal part densely covered with microtrichia in a median position.

Appendage 1a long, mostly not reaching tip of appendage 1.

Appendage 2 distal with parallel margins. On the middle part with a transverse ridge. From this to tip with long curved bristles.

Appendage 2a of medium length (61-90 μm) and reaching about 1/2 of appendage 2. At tip with spoon-shaped lamellar bristles. The distal



Figs 14–16. Abdomen of pupa. Dorsal view. – 14. *Micropsectra lindebergi*. – 15. *M. notescens*. – 16. *M. junci*.



Fig. 17. *Micropsectra contracta*. Hypopygium. Dorsal view. (From Reiss 1965, fig. 1).

extension sharply rising from stem. Basal with long simple bristles.

Dististyle stout, towards tip gradually narrowing.

IMAGO FEMALE: Wing length: 3.05–3.25 mm.

Colour: Similar to the ♂.

Head: Instead of frontal tubercles two broad sclerotized ridges. Antenna with 6 flagellomeres, the first and second are fused. Flagellomeres 1–5 with 5–7 long bristles. Flagellomere 6 with 1–2 long bristles. The thin distal part of flagellomeres 2–5 with 2 hyalin sensory bristles. Flagellomere 1 with 1 short sensory bristle and flagellomere 6 with 15–23 sensory bristles.

Length of flagellomeres 1–6 in  $\mu\text{m}$  ( $n=1$ ):

|         |    |     |    |     |
|---------|----|-----|----|-----|
| 1 and 2 | 3  | 4   | 5  | 6   |
| 135     | 91 | 101 | 99 | 158 |

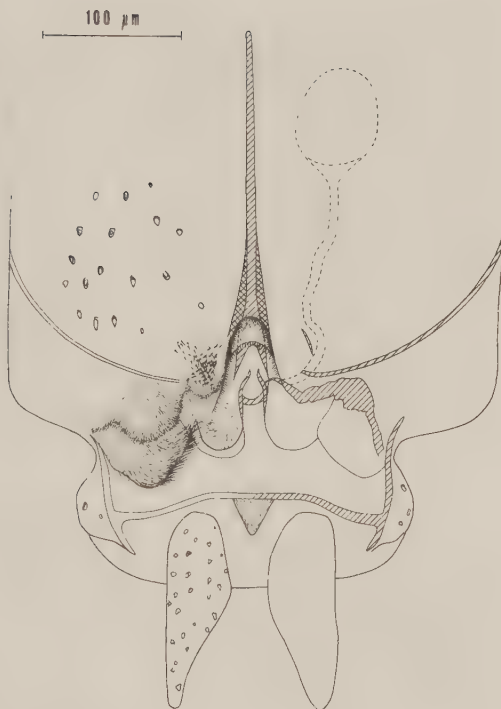
Thorax: Acrostichals reach antepronotum in two rows. Dorsocentrals reach antepronotum. Prealar 1–3. Scutellars in one row.

Wing: More densely covered with macrotrichia than by the ♂. The fields between c and  $r_{4+5}$  and the field between an and cu (except for the false vein) are free from macrotrichia. All veins except m from cross-vein r-m to base covered with macrotrichia.

Legs: L.R.(P<sub>I</sub>)=1.49 ( $n=1$ ). L.R.(P<sub>II</sub>)=0.54–0.58. Claws and tibial combs as in the ♂. Ta<sub>I</sub> of P<sub>II</sub> with 50–57 hook-shaped bristles on distal  $\frac{4}{5}$ .

Apex of abdomen (fig. 18): Postgenital plate triangular in ventral view. Cerci as in fig. 18, 151  $\mu\text{m}$  long. 2 suboval spermathecae present. Dorsomesal and ventrolateral lobes of gonapophysis VIII not clearly divided from each other.

Fig. 18. *Microspectra contracta*. Apex of female abdomen. Ventral view.



At base of dorsomesal lobe a group of differentiated bristles arranged in 10–12 rows. Dorsomesal lobe surrounded by a membrane. Median margin of ventrolateral lobe with a fringe of longer bristles arranged in irregular rows.

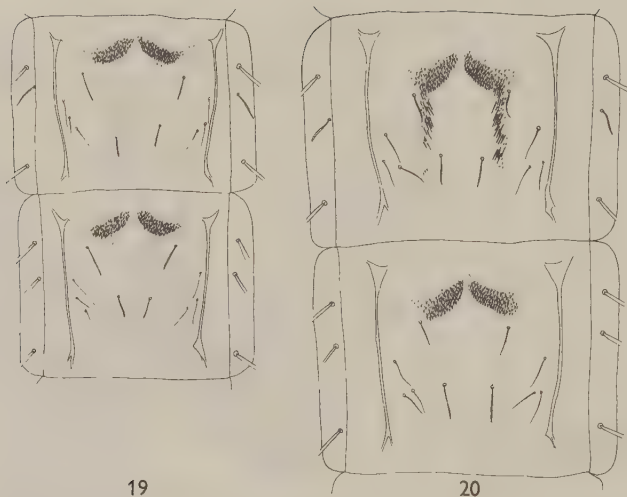
**PUPA** (fig. 20): Morphologically very similar to *M. apposita*. Differs from that species in having 69–90 filamentous hairs on anal lobe against 53–55 by *M. apposita*.

#### *Taxonomic remarks*

The ♂♂ of *M. contracta* are morphologically very similar to those of *M. junci* and *M. apposita*. Differ from *M. junci* in having a relatively shorter appendage 2a which is about  $\frac{1}{2}$  of the length of appendage 2. Appendage 2a of *M. junci* reaches about  $\frac{2}{3}$  of the length of appendage 2

in most specimens (figs 17, 24, 40, 41). In *M. contracta* there is no sharp transition between appendage 2a and appendage 1, the bases of which are moreover in the same plane (fig. 21). *M. junci* has a more sharp transition between the two appendages and the base of appendage 2a is situated more ventrally compared to the base of appendage 1 (fig. 22). Appendage 1a of *M. contracta* long and lacks the bend which is present in the thinner and usually shorter appendage 1a of *M. junci* (figs 21, 22). *M. contracta* and *M. apposita* are morphologically very similar and no diagnostic character has been found. *M. contracta* differs from *M. notescens* in the shape of appendage 2 which lacks the ball-shaped swelling present in *M. notescens*.

The ♀♀ differ from those of *M. apposita* in



Figs 19-20. Tergites IV-V of pupa. - 19. *Micropsectra notescens*. - 20. *M. contracta*. (From Reiss 1965, figs 7a-b).

the shape of the dorsomesal and ventrolateral lobes which are not clearly divided from each other in *M. contracta*. The marginal bristles on ventrolateral lobe longer in *M. contracta*. *M. contracta* differ from *M. notescens* in the shape of the ventrolateral lobe and in having a larger number and more distinct differentiated bristles at base of dorsomesal lobe.

The pupae belong to the species in the *notescens*-group which have 2 LS and 1 L-bristles on segment IV. It differs (together with *M. apposita*) from the other members of this group by the more or less developed rows of long spinules posteriorly of the fields with short spinules on tergite IV. Differs from *M. apposita* in the number of filamentous hairs on the anal lobe (69-90 against 53-55).

#### Ecology

The ecology of *M. contracta* has been studied in Lake Bodensee by Reiss (1965, 1968). The larvae were found at depths of between 5 and 210 m. In Überlinger See, a bay of Lake Bodensee, the highest abundance was found at depths of between 30 and 100 m with a maximum abundance of 4700 ind./m<sup>2</sup> at a depth of 80 m.

Catches with funnel-traps from depths >45 m

in the profundal zone showed that the species hatches from April to mid November without apparent maxima. During the winter a small number of Pe and imagines were seen on the lake.

In the upper part of the profundal of Lake Bodensee *M. contracta* was found together with *M. groenlandica* Anders.

#### General distribution

France, Germany and Switzerland.

#### 6. *Micropsectra apposita* (Walker) (Figs 23, 30, 35)

*Chironomus appositus* Walker, 1856, p. 191.

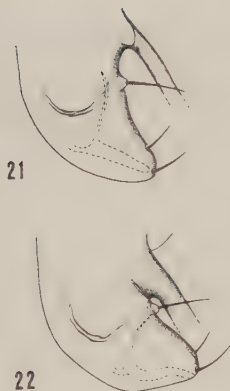
*Tanytarsus (Micropsectra) trivialis* Kieffer, 1911, p. 58. N.syn.

*Micropsectra dentatilobus* Kieffer, 1925, pp. 224-225. N.syn.

#### Type area: England.

*Type material*: 1 pinned ♂ (lectotype designated by me cf. p. 136) labelled "Type. *Chironomus appositus* Wlk", "Pres. by F. Walker 56-50".

*Additional material studied*: Denmark: Jylland, Linding å, 2 ♂♂ 6.V.1965, leg. C. Lindegaard-Peter-



Figs 21-22. Appendages 1, 1a and 2a of hypopygium. Dorsal view. - 21. *Microspectra contracta*. - 22. *M. junci*.

sen. Finland: N. Riihimäki, Punkanoja, 3 ♂♂ VIII. 1953, leg. M. Hirvenoja; Lk. Sodankylä, Kotaoja, 3 ♂♂ and 1 ♀ 9.VI.1959, leg. M. Hirvenoja. Sweden: Sk. Borstbäcken 1 km N Vombsjön, 5 ♂♂ 27.VI-17.VII. 1972, 1 ♂ 21.VIII.1972, 1 ♂ (with pupal exuvium) 23.VI.1975, 1 ♀ (with pupal exuvium) 24.VI.1975, 1 ♀ (with larval skin and pupal exuvium) 2.VII.1975, leg. L. Sävedal.

#### Description

IMAGO MALE: *Wing length*: 2.41-3.13 mm.

*Colour*: Sternum, coxae, mesonotal stripes and scutellum black. The other parts of thorax brown. Frontal femur black in distal half. Frontal tibia black. Middle and hind legs brown. Anterior half of abdomen reddish brown. Posterior part darker.

*Head*: Frontal tubercles small. A.R.=1.36-1.63.

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealars 3. Scutellars in one row.

*Wing*: Macrotrichia on whole wing except for the most basal part. The fields between c and  $r_{4+5}$  are free from macrotrichia. All veins except the basal  $1/2$  of sc and the basal  $1/2$  of m covered with macrotrichia. Stem vein with 2 long bristles.

Venation similar to *M. lindebergi*.

*Legs*: L.R.(P1)=1.44-1.62. L.R.(P11)=0.59-0.61. Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender.

Pulvilli small. Ta1 of P11 with 5-7 hook-shaped bristles on distal  $1/3-1/7$ .

*Hypopygium* (figs 30, 35): Anal tergite with small lateral teeth and 2-4 bristles in median part. Anal tergal bands separated. Anal point crests of medium height (figs 30, 35). Anal tergite without or with only a weak hump anterior of the anal point crests. Anal point with 2-3 lateral bristles on each side.

Appendage 1 triangular and bent in median direction. Dorsal with 5-6 bristles and 2-3 bristles at tip. On the basal part with a group of microtrichia in a median position.

Appendage 1a long, reaching tip of appendage 1 or a little beyond.

Appendage 2 distal with nearly parallel margins. On the middle part with a transverse ridge. From this to tip with long curved bristles.

Appendage 2a of medium length (57-78  $\mu$ m) and reaching about  $1/2$  of appendage 2. At tip with spoon-shaped lamellar bristles. The distal extension sharply rising from stem. Basal with long simple bristles.

Dististyle slightly varying, in most specimens stout, towards tip gradually narrowing.

IMAGO FEMALE: *Wing length*: 2.31-2.81 mm.

*Colour*: Similar to the ♂.

*Head*: Frontal tubercles at base standing on a ridge-shaped structure. Antenna with 6 flagellomeres, the first and second are fused together. Flagellomere 1 with 3 and flagellomere 2-5 with 7-8 long bristles. Flagellomere 6 without (?) long bristle. The thin distal part of flagellomeres 2-5 with 2 hyaline sensory bristles. Flagellomere 1 with 1 short sensory bristle and flagellomere 7 with about 18 sensory bristles.

Length of flagellomeres 1-6 in  $\mu$ m (n=1):

| 1 and 2 | 3  | 4  | 5  | 6   |
|---------|----|----|----|-----|
| 119     | 87 | 95 | 91 | 130 |

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals reach antepronotum in a number of irregular rows which in posterior direction converge into one row. Prealars 2-3. Scutellars in one row.

*Wing*: More densely covered with macrotrichia than the ♂. The fields between c and  $r_{4+5}$  and the field between an and cu (except for the false vein) are free from macrotrichia. All veins except for the most basal part of m covered with macrotrichia.

*Legs*: L.R.(P1)=1.51-1.56. L.R.(P11)=0.55-0.57. Claws and tibial combs as in the ♂. Ta1 of P11 with 46-54 hook-shaped bristles on distal  $1/10-4/5$ .



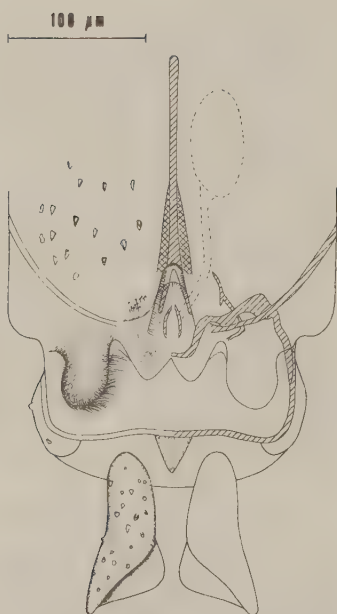


Fig. 23. *Microspectra apposita*. Apex of female abdomen. Ventral view.

*Apex of abdomen* (fig. 23): Postgenital plate triangular in ventral view. Cerci as in fig. 23, 95–111 μm long. 2 suboval spermathecae present. Dorsomesal and ventrolateral lobes of gonapophysis VIII clearly divided from each other. Dorsomesal lobe weakly triangular. At base of dorsomesal lobe a group of differentiated bristles. Median margin of ventrolateral lobe covered with a fringe of longer bristles.

**PUPA:** Length: 5.0–6.1 mm.

**Colour:** Exuvia transparent except for the margins of wing and leg sheaths, the light brownish cephalothorax, the muscle patches, two dark stripes on tergite I, two dark patches on tergite II, narrow dark stripes along the margins of tergites V–IX, the dark coloured long and short spinules on tergites III–V, the dark area under the fields with short spinules on tergites IV–V, and the caudo-lateral combs of segment VIII.

**Cephalothorax:** Frontal tubercles well developed, each with a long bristle. Thoracic horn 930 μm, apically pointed. The outer lateral margin completely covered with long bristles. The apical 1/2 of inner lateral margin completely covered with long bristles. Bristles about 1/4 of length of thoracic horn.

**Chaetotaxy of thorax:** Similar to *M. lindebergi*.

**Abdomen:** Tergite I without shagreenation. Tergite II with a row of anteriorly bent hooks, which covers a little more than 1/2 of the segment width. Pseudopods on the same segment. The shagreenation covers the whole segment except a field on the anterior part, the area lateral of the muscle patches to the edge of the tergite and an anal-median patch. Tergite III with two fields of long spinules which are surrounded by shagreenation except at their posterior part. Tergite IV with two fields of short spinules, from the lateral margin of each field a row of rather long spinules in posterior direction. Posteriorly of each row a field of shagreenation, widening in posterior direction. The rest of the tergite free from shagreenation. Tergite V with two fields of short spinules. In posterior direction from each field a patch of shagreenation. Tergite VI with two median rows with fine shagreenation. The rows are separated from each other except in the anterior part of the tergite. Tergite VII without shagreenation. Tergite VIII with two fields of shagreenation in the anterior edges. Caudo-lateral combs of segment VIII with 5–6 marginal teeth. Anal lobe with 53–55 filamentous hairs.

**Chaetotaxy of abdomen:**

|    | I | II  | III | IV | V | VI | VII | VIII | IX |
|----|---|-----|-----|----|---|----|-----|------|----|
| D  | 3 | 3–4 | 5   | 5  | 5 | 5  | 5   | 1    | 1  |
| L  | – | 3   | 3   | 1  | – | –  | –   | –    | –  |
| LS | – | –   | –   | 2  | 3 | 4  | 4   | 4    | –  |
| V  | 1 | 4   | 4   | 4  | 4 | 4  | 4   | 1    | –  |

O-bristles on sternite II–VIII.

In one of the specimens there is an additional slender bristle on the anterior edges of tergite IX. On the rest of the specimens there are only light coloured spots indicating the base of the bristle.

**Taxonomic remarks**

The ♂♂ are morphologically very similar to *M. contracta* and no diagnostic character has been found. In most specimens of *M. apposita* the anal point makes a more slender impression than that of *M. contracta*. Since the anal point varies in the latter species this character has no

diagnostic value. *M. apposita* differs from *M. junci* in the same characters as *M. contracta* (cf. p. 127).

The difference between *M. apposita* and *M. contracta* are most marked in the ♀♀ (cf. p. 127 and figs 18, 23).

The pupa of *M. apposita* differs from that of *M. contracta* in having only 53–55 filamentous hairs on the anal lobe against 69–90 by the latter species.

### Ecology

In the small stream Borstbäcken (South Sweden) the larvae were found at lentic places in the epirithral zone together with *M. nesciens*.

### General distribution

Denmark, England, Germany and Sweden.

### 7. *Micropsectra junci* (Meigen)

(Figs 16, 22, 24, 25, 31, 36, 37, 41, 43, 44)

*Chironomus junci* Meigen, 1818, p. 50.

*Chironomus praecox* Wiedemann, in Meigen, 1818, p. 49 (nec auct.). N.syn.

*Chironomus brunneipes* Zetterstedt, 1850, pp. 3518–3519. N.syn.

*Chironomus gmundensis* Egger, 1863, p. 1109. N.syn.

*Tanytarsus (Calopsectra) flavofasciatus* Kieffer, 1911, pp. 47–48. N.syn.

*Tanytarsus* (?) *Tanytarsus* or *Micropsectra* *longitarsis* Kieffer, 1911, pp. 54–55. N.syn.

*Tanytarsus gmundensis* var. *subviridis* Goetghebuer, 1921, p. 124. N.syn.

*Tanytarsus (Micropsectra) subviridis* Goetghebuer: Edwards, 1929, p. 407.

Since the name *M. praecox* has been in common use with a meaning differing from that of the present paper, I have chosen to apply the name *M. junci* to this species in order to avoid confusion.

*Type area*: Germany.

*Type material*: 2 ♂♂ (one lacking abdomen) and 1 ♀ in MNHN. The ♂ with abdomen designated as lectotype by E. J. Fittkau (cf. p. 139).

*Additional material studied*: Finland: Li. Utsjoki, Karigasniemi, 2 ♂♂ 1965; Utsjoki, Karigasniemi No. 7, 1 ♂ 5.VI.1968, leg. O. Paasivirta. – Lk. Rajajoki, 1 ♂ 28.VII.1969, leg. L. Paasivirta. – Le. Lake Kilpisjärvi, Tsahkaljavi, 4 ♂♂ 28.VI.1969, leg. L. Paasivirta. – Sa. Punkasalmi, Kauvonniemi, Ullinsuo, 1 ♂ 9.VII.1971, 2 ♂♂ 16.VIII.1971, leg. B. Lindeberg. – N. Espoo, Kolmperä, 3 ♂♂ (one with pupal exuvium) and 2 Pe 4.V.1974, leg. B. Lindeberg. Germany: Fulda, Erlenauwald, 1 ♂ 3.X.1951, 1 ♂ 5.X.1951, 4 ♂♂ 11.IX.1951, 17 ♂♂ III.1952, 32 ♂♂ IV.1952, 5 ♂♂

V.1952, 7 ♂♂ and 8 Pe X.1952, 1 ♂ 13.IX.1952, 1 ♂ 1952, 2 ♂♂ IV.1953, 1 ♂ 11.IX.1957, leg. E. J. Fittkau; Fulda, 1 ♂ 23.VII.1952, leg. E. J. Fittkau; Wasserkuppe 1, 5 ♂♂ 20.V.1953, 3 ♂♂ 3.VIII.1953, 2 ♂♂ 9.IX.1953, 1 ♂ 1.X.1953, 3 ♂♂ 14.X.1953, leg. E. J. Fittkau; Wasserkuppe 2, 1 ♂ 10.IV.1953, 1 ♂ 24.IV.1953, 7 ♂♂ 20.V.1953, 6 ♂♂ 11.V.–1.VI.1958, 5 ♂♂ 10.IV.–10.V.1977, 5 ♂♂ 21.IV.–28.IV.1977, 4 ♂♂ and 1 Pe 22.V.–25.VII.1977, leg. E. J. Fittkau; Wasserkuppe 3, 4 ♂♂ 20.V.1953, leg. E. J. Fittkau; Wasserkuppe 6, 5 ♂♂ 20.V.1953, 1 ♂ 1.VII.1953, 2 ♂♂ 3.VIII.1953, 1 ♂ 10.VIII.1953, 2 ♂♂ 25.VIII.1953, 1 ♂ 19.IX.1953, 1 ♂ 21.IX.1953, 1 ♂ 3.X.1953, 2 ♂♂ (one with pupal exuvium) 14.X.1953, leg. E. J. Fittkau; Wasserkuppe, Wiesenquelle, 2 ♂♂ 7.V.1953, leg. E. J. Fittkau; Wasserkuppe, 2 ♂♂ 27.X.1952, 1 ♂ (with pupal exuvium) 10.IV.1963, leg. E. J. Fittkau; Sauerland, 993, 1001, A 1101 and 1188, 4 ♂♂, leg. Dittmar; Überlingen/Bodensee, 1 ♂ 1.V.1964, leg. F. Reiss; Andelshofer Weiher, 1 ♂ 14.IV.1963, leg. F. Reiss. Sweden: Bl. Mörrum, 1 ♂ 27.IV.1946, leg. L. Brundin. – Sm. Vartorpån, 1 ♂ 28.IV.1945; Gårdsby, 1 ♂ 30.IV.1945; Urshult, Hackekvarn, 1 ♂ 1.V.1946; Trummen, 1 ♂ 2.V.1946; Bergkvara, 5 ♂♂ 2.V.1946; Innaren, 3 ♂♂ 3.V.1946; Innaren, N. Åreda, 4 ♂♂ 5.V.1955; Fiolen, 9 ♂♂ 6.V.1946, leg. L. Brundin. – Ög. Sommen, Munkholmen, Marek, 5 ♂♂ 25.IV.1946; Ö. Läger, V. Ryd, 6 ♂♂ 25.IV.1946, leg. L. Brundin.

### Description

IMAGO MALE: *Wing length*: 2.19–3.44 mm.

*Colour*: Thorax dark. Legs light brownish. Anterior part of abdomen green, posterior part brown.

*Head*: Frontal tubercles very small. A.R.=1.04–1.49.

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals varying, in some specimens reaching antepronotum in one row or in a number of rows, in other specimens ending between antepronotum and scutellum with or without a group of bristles close to antepronotum or with 1–2 single bristles between antepronotum and the main row of acrostichals. Prealars 2–3. Scutellars in one row.

*Wing*: Macrotrichia on whole wing except for the most basal part. The fields between c and r<sub>4+5</sub> are free from macrotrichia. All veins except the basal 1/2 of sc and m from cross-vein r-m to base covered with macrotrichia.

Venation similar to *M. lindebergi* n.sp.

*Legs*: L.R.(P<sub>I</sub>)=1.40–1.82. L.R.(P<sub>II</sub>)=0.52–0.65. Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender. Pulvilli small. Tai of P<sub>II</sub> with 4–8 hook-shaped bristles on distal 1/10–1/3.

*Hypopygium* (figs 22, 24, 31, 36, 37, 41, 43, 44): Anal tergite with lateral teeth of medium size and 4–6 bristles in median part. Anal tergal



Fig. 24. *Micropsectra junci*. Hypopygium. Dorsal view.

bands separated. Anal point crests well developed (figs 31, 36, 37). Anal tergite with hump, usually well developed, in front of the anal point crests. Anal point broadly acute with 2-4 lateral bristles on each side.

Appendage 1 finger-shaped, tip broadly rounded and bent in median direction. Dorsal with 5-6 bristles and 2-3 bristles at tip. On the basal part with a large group of microtrichia on the dorsal side.

Appendage 1a of small to median size, usually with a bend on middle part, never reaching tip of appendage 1.

Appendage 2 on distal  $\frac{1}{2}$  with almost parallel margins. On middle part with a transverse ridge. From this to tip with long curved bristles.

Appendage 2a (figs 24, 41, 44) long (65-96  $\mu\text{m}$ ), usually reaching about  $\frac{2}{3}$  of the length of appendage 2. On distal part with spoon-shaped lamellar bristles. Basal with rather long simple bristles.

IMAGO FEMALE: No available material. Descriptions of the females are given by Meigen (1818: 50 sub *Ch. junci*) and Kieffer (1911: 54-55 sub *T. longitarsis*).



Fig. 25. *Micropsectra junci*. Thorax of pupa. Lateral view.

PUPA: Length: 4.28–5.22 mm.

**Colour:** Exuvia transparent except for the margins of wing and leg sheaths, the light brownish cephalothorax, two light brownish fields on posterior part of tergite II, light brownish stripes along the margins of segments VII–VIII, the light brownish segment IX, the muscle patches and the dark brown caudo-lateral combs of segment VIII.

**Cephalothorax** (fig. 25): Frontal tubercles well developed, each with a long bristle. Thoracic horn 550  $\mu$ m. Broad at base, towards tip gradually narrowing. Lateral margin covered with long bristles. Median margin on outer  $2/3$  with long bristles. Bristles about  $1/3$  of length of thoracic horn. In front of the wing sheaths a tubular structure.

**Chaetotaxy of thorax:** Similar to *M. lindebergi* n.sp.

**Abdomen** (fig. 16): Tergite I without shagreenation. Tergite II with a row of anteriorly bent hooks which covers about  $1/2$  of the segment width. Pseudopods on the same segment. The shagreenation covers the whole area between the muscle patches except for the most anterior part, a number of patches immediately median of the muscle patches and an anal-median patch. Tergite III with two fields of long spinules which are surrounded by shagreenation. Tergite IV with two fields of short spinules in some specimens confluent and forming one field (cf. fig. 16). Posterior to each field a patch of shagreenation, broader in posterior direction. Tergite V with two fields of short spinules, posterior to each field a patch of shagreenation. Tergite VI with two separated bands of shagreenation. Tergite VII without shagreenation. Tergite VIII with two fields of shagreenation in the anterior part immediately median of the

muscle patches. Caudo-lateral combs of segment VIII with about 6–7 coarse spines. Anal lobe with 62–73 filamentous hairs.

**Chaetotaxy of abdomen:** Similar to *M. notescens*.

#### Taxonomic remarks

The ♂♂ of *M. junci* are morphologically very similar to those of *M. contracta* and *M. apposita*. They differ from these species in the characters given under "Taxonomic remarks" on p. 127.

The pupae of *M. junci* differ from the other known pupae of this group in having a tubular structure in front of the wing sheaths (fig. 25).

A correlation between the different ways in which the dorsocentrals of the ♂♂ are distributed and other characters such as, A.R., L.R. (P<sub>I</sub>), L.R.(P<sub>II</sub>), wing length, length of appendage 2a and shape of the hypopygium, has not been found. I therefore consider *M. junci* as here delimited to be one species despite the fact that its complicated distribution pattern of the dorsocentrals has not been found within any other species of this group.

In three Norwegian lakes (Bukkehammer-tjärn, 1589 m above sea level, Prestesteinvatnet, 1343, and Stridätjärn, 1469 m) Brundin found (in litt.) specimens of one species (?) in which the ♂♂ are very similar to *M. junci*. The pupae differ in the development of the thoracic horn. The thoracic horn of these specimens are very stout and the bristles unusually long, more than  $1/2$  of the length of the thoracic horn (fig. 26). According to Brundin the ♂♂ were characterized by having only 20 bristles on tergite VIII against normally about 40 by *M. junci*. In the material from Germany, Fulda, there are, however, specimens with fewer than 20 bristles. In the shape of the hypopygium the Norwegian specimens are identical with *M. junci*. Unfortunately the material from Norway is sparse, thus making it impossible to evaluate the status of this form.

#### Ecology

*M. junci* is a crenophilic species known from helocrenic springs and the epirithral zone of streams. In the epirithral zone *M. junci* inhabits lentic places rich in detritus and with a sandy, muddy bottom. In Germany, Wasserkuppe, the species is known from helocrenic springs and the epirithral zone of streams together with *Micropsectra notescens*, *M. roseiventris*, *M. lindrothi*, *Macropelopia notata*, and *M. nebulosa* (Fittkau in litt.).



Fig. 26. *Micropsectra* sp. Thoracic horn of pupa. Dorsal view. (del. L. Brundin).

#### General distribution

Austria, Belgium, Finland, Germany and Sweden.

#### 8. *Micropsectra nepalensis* n.sp.

(Fig. 32)

*Type locality:* Nepal, surroundings of Kathmandu, 27° 57' N. 84° 59' E.

*Holotype:* 1 ♂ labelled "26.-31.V.67. *Micropsectra* Sp. N2. Canad. Nepal Exped. 27° 57' N. 84° 59' E. Mal. tr. 5 10100". Type mounted on microscopic slide in Euparal, in coll. CNC.

*Material studied:* The holotype only.

#### Description

IMAGO MALE: *Wing length:* 2.70 mm.

*Colour:* Thorax with mesonotal stripes, postnotum and a patch below the notopleural suture dark brown. The rest of thorax and the abdomen light brown.

*Head:* A.R. = -.

*Thorax:* Acrostichals reach anteprototum. Dorsocentrals end between scutellum and anteprototum. Prealar 3. Scutellars in one row.

*Wing:* Macrotrichia on distal  $\frac{4}{5}$  of wing. Free from macrotrichia are the fields between  $r_{4+5}$  and c. All veins except  $sc$ ,  $r_{2+3}$ , cross-vein  $r-m$ ,  $m$  basal of cross-vein  $r-m$  and the basal part of  $cu$  covered with macrotrichia.

Venation similar to *M. lindebergi* except for that the an-vein ends distal of  $fcu$ .

*Legs:* L.R.(P<sub>1</sub>) = 1.72. L.R.(P<sub>11</sub>) = -. Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender.

*Hypopygium* (fig. 32): Anal tergite with lateral teeth. Anal tergal bands separated. Anal tergite with 2 bristles in median part. Anal point crests of medium height, confluent at tip of anal point. Anal point broad and rather long.

Appendage 1 broad at base, towards tip narrowing. The narrowing part of the appendage bent in median direction. Dorsal with 6 bristles and 2 bristles at tip. Microtrichia absent on basal part of the appendage.

Appendage 1a short and hook-shaped.

Appendage 2 long and slender, without transverse ridge. Distal  $\frac{1}{2}$  with long curved bristles.

Appendage 2a short (43  $\mu$ m), with spoon-shaped lamellar bristles on distal  $\frac{3}{4}$ . Basal  $\frac{1}{4}$  with simple bristles.

Dististyle short and broad, tip transversely cut.

FEMALE, PUPA and LARVA: unknown.

#### Taxonomic remarks

This species is characterized by the short, hook-shaped appendage 1a of the hypopygium.

According to the morphological characters of the ♂, this species seems to be a member of the *notescens*-group. The definite assignment of *M. nepalensis* to the *notescens*-group remains, however, uncertain until the premature stages are found.

#### Ecology

Not known. The only known specimen was collected in a Malaise trap.

#### 9. *Micropsectra montana* n.sp.

(Fig. 33)

*Type locality:* Nepal, surroundings of Kathmandu, 27° 56' N. 85° 00' E.

*Holotype:* 1 ♂ labelled "17.-23.V.1967. *Micropsectra* Sp. N3. Canad. Nepal Exped. 27° 56' N. 85° 00' E. Mal. tr. 10000". Holotype mounted on microscopic slide in Euparal, in coll. CNC.

*Material studied:* The holotype only.

#### Description

IMAGO MALE: *Wing length:* 2.78 mm.

*Colour:* Thorax with mesonotal stripes, postnotum and preepisternum brownish yellow. The rest of thorax and abdomen paler coloured.



Figs 27-31. Anal point. Lateral view. - 27. *Microgaster insignilobus*. - 28. *M. lindrothi*. - 29. *M. notescens*. - 30. *M. apposita*. - 31. *M. junci*.

*Head*: A.R. = -.

*Thorax*: Acrostichals reach antepronotum. Dorsocentrals reach antepronotum in one row. Prealars 4. Scutellars in one row.

*Wing*: Macrotrichia on distal  $\frac{4}{5}$  of wing. Free from macrotrichia are the fields between c and  $r_{4+5}$ . All veins except sc, cross-vein r-m, m

basal of cross-vein r-m and the basal part of cu covered with macrotrichia.

Venation similar to *M. lindebergi*.

*Legs*: L.R.(P<sub>1</sub>) = -. L.R.(P<sub>11</sub>) = -. Front tibia with short spur. Combs of middle and hind tibia fused.

*Hypopygium* (fig. 33): Anal tergite with lateral teeth. Anal tergal bands separated. Anal tergite with 3 bristles in median part. Anal point crests of medium height. Anal point long with parallel margins, tip rounded.

Appendage 1 stout, at tip broadly rounded and bent in median direction. Dorsal with 8 bristles, at tip with 2 bristles. A dorsal group of macrotrichia in median position at base of appendage.

Appendage 1a long and slender, reaching beyond tip of appendage 1.

Appendage 2 slender, without transverse ridge. Distal  $\frac{1}{2}$  with long curved bristles.

Appendage 2a long and slender (65  $\mu$ m) with spoon-shaped lamellar bristles on distal  $\frac{1}{3}$ . Basal  $\frac{2}{3}$  with simple bristles.

Dististyle long and slender. Tip obliquely cut.

FEMALE, PUPA and LARVA: unknown.

#### Taxonomic remarks

The ♂♂ differ from the other members of this group by having an anal point with parallel margins and tip rounded, and in lacking a transverse ridge on appendage 2. *M. notescens* and *M. nepalensis* which also lack a transverse ridge on appendage 2 differ from *M. montana* by having a ball-shaped swelling at tip of appendage 2 and a short hook-shaped appendage 1a, respectively.

The morphological characters of the ♂ indicates that *M. montana* is a member of the *notescens*-group. The definite assignment will remain uncertain until the premature stages are found.

#### Ecology

Not known. The only known specimen was collected in a Malaise trap.



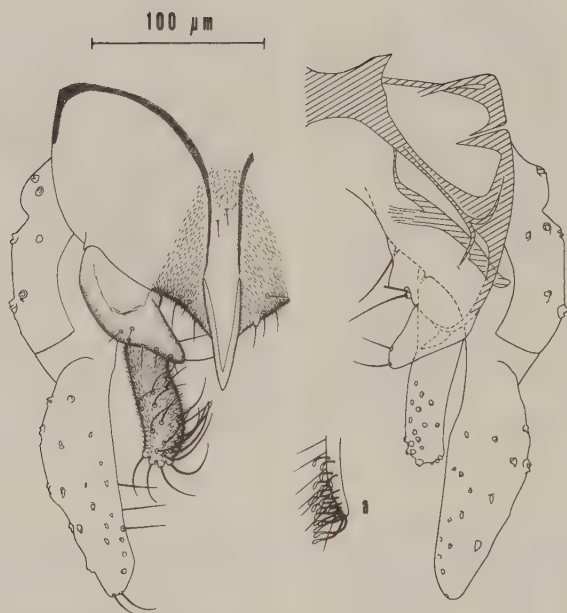


Fig. 32. *Micropsectra nepalensis*. Hypopygium. Dorsal view.

### Designation of neotype and lectotypes *Chironomus appositus* Walker, 1856

Male described on material from England. In BMNH one pinned male with hypopygium mounted, labelled "Type, *Chironomus appositus* Wlk", "Pres. by F. Walker 56-50". I have designated this specimen as lectotype and labelled it accordingly.

The lectotype is morphologically very similar to specimens found in Borstbäcken, a small stream in South Sweden. The ♀♀ from Borstbäcken are morphologically different from the ♀♀ of *M. contracta* whereas the ♂♂ of the two forms are very similar. Cranston (in litt.) found specimens of a species morphologically identical with *Chironomus appositus* in small streams containing large amounts of organic detritus. The streams were running through woodlands. On ecological and morphological grounds I

consider *Chironomus appositus* to be conspecific with the form from South Sweden and therefore think that it should not be synonymized with *M. contracta*. Present status: *Micropsectra apposita* (Walker, 1856).

### *Tanytarsus* (*Tetratanytarsus*) *bifilis* Kieffer, 1922

Male and female described on material from Germany, Westphalia, Sauerland, leg. A. Thienemann. The specimens were obtained by hatching. In IRSN (coll. Types de Kieffer) a mount on microscopic slide labelled "*Micropsectra bifilis* K.", "R.I.Sc.N.B. 18.073 Coll et det., M. Goetghebuer", "*Micropsectra bifilis* K.", "Type de Kieffer". The mount consists of a pupal exuvium, the hypopygium, part of the abdomen, and the legs of a male. The other parts of the specimen are missing. I have designated this specimen as lectotype and labelled

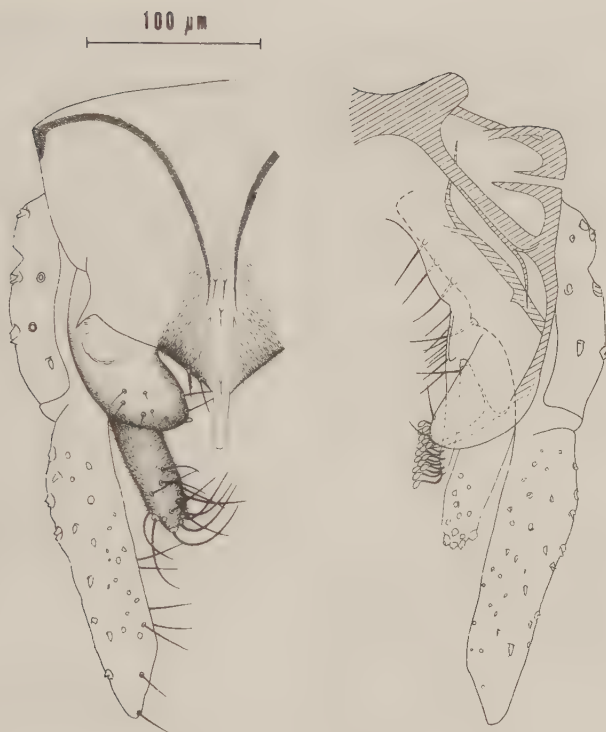


Fig. 33. *Micropsectra montana*. Hypopygium. Dorsal view. — a) appendage 2a.

it accordingly. Synonymy: *Micropsectra notescens* (Walker, 1856), syn.: *Tanytarsus* (*Tetratanytarsus*) *bifilis* Kieffer, 1922. N.syn.

#### ***Chironomus brunnipes* Zetterstedt, 1850**

Described on material from Sweden, Jmt., Åreskutan (1 ♂) and Jmt., Faxälven (1 ♂ and 1 ♀). The specimens from Faxälven belong to the subfamily Orthoclaudiinae. I have designated the ♂ from Åreskutan, labelled "C. brunnipes Zett. ♂. Åreskutan", as lectotype and labelled accordingly. I have chosen to apply the name *Chironomus brunnipes* to the specimen which belongs to the genus *Micropsectra* since *C. brunnipes* has been commonly referred to this

genus. The lectotype is deposited in LUZI (coll. Diptera Scandinaviae). Synonymy: *Micropsectra junci* (Meigen, 1818), syn.: *Chironomus brunnipes* Zetterstedt, 1850. N.syn.

#### ***Micropsectra dentatilobus* Kieffer, 1925**

Male and female described on material from a small stream in Germany, Holstein. The material was hatched by A. Thienemann. In IRSN (coll. Types de Kieffer) one male mounted on microscopic slide is labelled "Micropsectra dentatilobus K.", "Micropsectra dentatilobus K.", "R.I.Sc.N.B. 18.073, Coll. et det., M. Goetghebuer", "Type de Kieffer". I have designated this specimen as lectotype and labelled it accordingly.

The lectotype is morphological very similar to *M. apposita* and the specimens from Borstbäcken. Thienemann (unpubl. ms., 1946) described the pupa of *M. dentatilobus*. It can be seen from this description that Thienemann probably based his description on exuvia from two species. He mentioned the presence of a row of long spinules in posterior direction from each of the fields with short spinules on tergite IV in a part of the material. The pupae with a row of long spinules are specimens of *M. dentatilobus*. The specimens on which the description is based comes from Germany, Holstein, Selenter Dorfbach and Dersauer Mühlbach; Czechoslovakia, Moravia, Trebitsch. The specimens from the Selenter Dorfbach were found in muddy bottom substrate. On morphological and ecological ground I consider this species to be conspecific with *M. apposita*. Synonymy: *Micropectra apposita* (Walker, 1856), syn.: *Micropectra dentatilobus* Kieffer, 1925. N.syn.

**Tanytarsus (Calopsectra) flavofasciatus**  
Kieffer, 1911

Male described on material from Germany (leg. A. Thienemann) obtained by hatching. In IRSN (coll. Types de Kieffer) one mount on microscopic slide labelled "Micropectra flavofasciata K.", "Micropectra flavofasciata K.", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer". I have designated this specimen as lectotype and labelled it accordingly. The leg and wings which are present in the mount do not belong to the lectotype specimen and do not come from any species in the genus *Micropectra*. Synonymy: *Micropectra junci* (Meigen, 1818), syn.: *Tanytarsus (Calopsectra) flavofasciatus* Kieffer, 1911. N.syn.

**Chironomus gmundensis** Egger, 1863

Described on male from Austria, Gmunden. In NMW there are 3 males from the type locality. One specimen lacks abdomen and one is lacking the head. Two of the specimens belong to the same species. The status of the specimen without the abdomen cannot be determined. I have designated the male which is in good condition as lectotype and labelled it accordingly. The lectotype is labelled with a golden yellow square and "Schiner 1869", "Aust. sup. Gmunden", "gmundensis det. Schiner", "Type", "Micropectra brunnipes Ztt=gmundensis Egg.". Synonymy: *Micropectra junci* (Meigen,

1818), syn.: *Chironomus gmundensis* Egger, 1863. N.syn.

**Tanytarsus gmundensis** var. **subviridis**  
Goetghebuer, 1921

Male described from a material characterized as "plusieurs exemplaires ♂ à Virton", Belgium. In IRSN (coll. Goetghebuer) there is one syn-type labelled "Virton 5.7.1913", "Type ♂ M. Goetghebuer", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer", "subviridis", "Micropectra subviridis Goetgh.". This specimen lacks abdomen. The same collection contains another male (with abdomen) from the type locality. This specimen is labelled "Virton (Ton) 29 7-1919 A. Tonnoir", "Tanytarsus gmundensis Egg var subviridis Gtgh", "Tanytarsus gmundensis Egg var.: subviridis Gtgh. M. Goetghebuer det. 1923". The second determination label is printed and must have been placed on the specimen after the description which can be seen from the date on the label. I regard the first determination label as placed on the pin in connection with the description. This specimen I have designated as lectotype and labelled accordingly. Synonymy: *Micropectra junci* (Meigen, 1818), syn.: *Tanytarsus gmundensis* var. *subviridis* Goetghebuer 1921. N.syn.

**Tanytarsus (Tanytarsus) hemipsilus**  
Kieffer, 1911

Male described on material from Germany (leg. A. Thienemann) obtained by hatching. In IRSN (coll. Types de Kieffer) on male is mounted on microscopic slide labelled "Micropectra hemipsilus K.", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer", "Micropectra hemipsilus K.", "Type de Kieffer". I have designated the specimen as lectotype and labelled it accordingly. Synonymy: *Micropectra notescens* (Walker, 1856), syn.: *Tanytarsus (Tanytarsus) hemipsilus* Kieffer, 1911. N.syn.

**Tanytarsus (Micropectra) inermipes**  
Kieffer, 1909

Male and female described on material from Germany collected by A. Thienemann. In IRSN (coll. Types de Kieffer) there is one mount with two hypopygia. The other parts of the specimens are missing. The mount is labelled "Micropectra inermipes K.", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer". I have designated the hypopygium to the right, as seen from the pin, as lectotype and labelled

it accordingly. The position of the lectotype is also marked by a drawing placed on the pin. Synonymy: *Microspectra notescens* (Walker, 1856), syn.: *Tanytarsus* (*Microspectra*) *inermipes* Kieffer, 1909. N.syn.

#### ***Microspectra insignilobus* Kieffer, 1924**

The existence of two morphologically very similar species, viz. *M. insignilobus* Kieffer and *M. lindebergi* n.sp., which both agree with the description by Kieffer makes it necessary to designate a neotype for *M. insignilobus*. Lenz (1927: 183–185) described the pupa of *M. insignilobus* from the same material on which Kieffer based his description of the adults. Unfortunately this description can be applied to either of the two species. Since only one of these species at present is known from Norway, I have designated one specimen of the Norwegian species as neotype. The neotype (one ♂) is labelled "Norway. Målsjöen, Klabu, 20.V.1972, leg. J.O. Solem and K. Aagaard. Klekkefelle 9 m". The neotype mounted on microscopic slide is in coll. LUZI. The characters differentiating *M. insignilobus* from the other species are given on p. 113. The original type-material has not been found in any of the following institutions: ZMUO, IRSN, BMNH, MNHN, MNM, NMW, MNHUB, MG, or LUZI and must be regarded as lost.

#### ***Tanytarsus* (*Calopsectra*) *insularis* Kieffer, 1911**

Male and female described on material from Germany, Rügen, leg. A. Thienemann. The specimens were obtained by hatching. In IRSN (coll. Types de Kieffer) one male is labelled "Microspectra insularis K.", "R.I.Sc.N.B. 18. 073 Coll et det., M. Goetghebuer", "Microspectra insularis K.", "Type de Kieffer". I have designated this specimen as lectotype and labelled it accordingly. Synonymy: *Microspectra notescens* (Walker, 1856), syn.: *Tanytarsus* (*Calopsectra*) *insularis* Kieffer, 1911. N.syn.

#### ***Chironomus junci* Meigen, 1818**

2 ♂♂ and 1 ♀ in MNHN. One of the males lacks the abdomen. The male with abdomen is designated as lectotype by present designation of E. J. Fittkau. I have not had the opportunity to study the lectotype but have studied a drawing made by E. J. Fittkau. The drawing con-

firms the specific identity between the specimens on which I have based my description on pp. 131–133 and the lectotype. I also want to thank L. Matile for checking a specimen from my collection against the lectotype. He reached the following conclusion (in litt.), "The genitalia check very well with *Ch. junci*, at least the hypopygium mounted on slide by Dr. Fittkau". The lectotype is labelled "Meigen 228/40" (the museum accession label of 1840), "junci ♂" (Meigen's label), "preparation" (Fittkau's label), "Lectotypus Chironomus junci Meig. design. 1976 Fittkau in Säwedal 1976". Present status: *Microspectra junci* (Meigen, 1818).

#### ***Microspectra lindrothi* Goetghebuer, 1931**

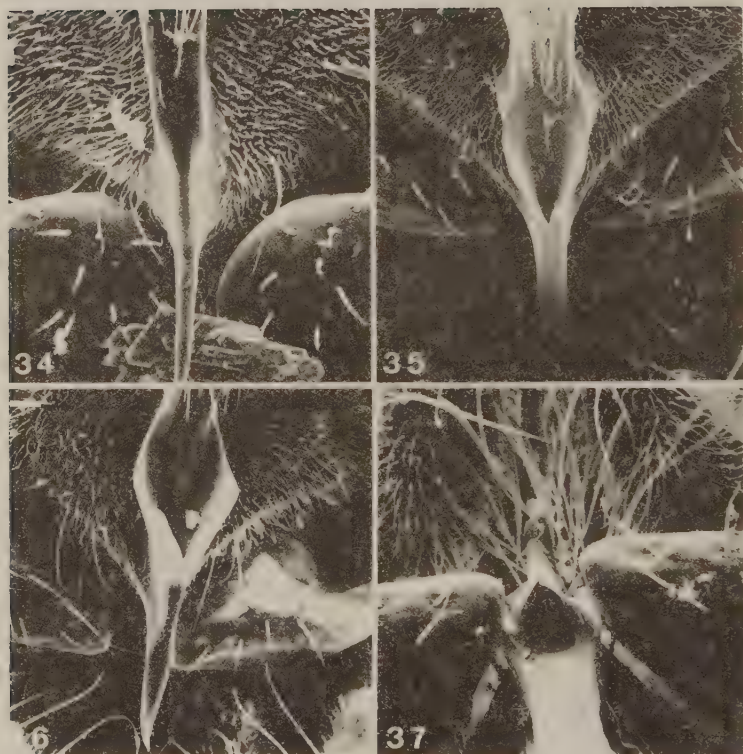
Described on one male from north Iceland, Skútustadir, south side of Lake Mývatn. The specimen is deposited in NMG. This specimen, labelled "173", "*Microspectra lindrothi* n.sp.", "Type ♂ M. Goetghebuer". I have labelled as holotype. Present status: *Microspectra lindrothi* Goetghebuer, 1931.

#### ***Tanytarsus* (*Tanytarsus*) *longitarsis* Kieffer, 1911**

Male and female described on material from Germany (leg. A. Thienemann) obtained by hatching. In IRSN (coll. Types de Kieffer) one male is mounted on a microscopic slide labelled "Type de Kieffer", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer", "Tanytarsus longitarsis K.", "Tanytarsus longitarsis K.". I have designated this specimen as lectotype and labelled it accordingly. Lindeberg (1967: 56) applied the name *T. longitarsis* to a member of the *Tanytarsus lestagei*-aggregate. He considered the type material to be lost and based his judgement on the larval and pupal instars present in MPI. According to Lindeberg this is the larval skins and pupal exuviae from which Kieffer obtained the imagines and based his description of *T. longitarsis*. The material must have been confused since the study of the lectotype reveals that *T. longitarsis* is a typical member of the genus *Microspectra*. Synonymy: *Microspectra junci* (Meigen, 1818), syn.: *Tanytarsus* (*Tanytarsus*) *longitarsis* Kieffer, 1911. N.syn.

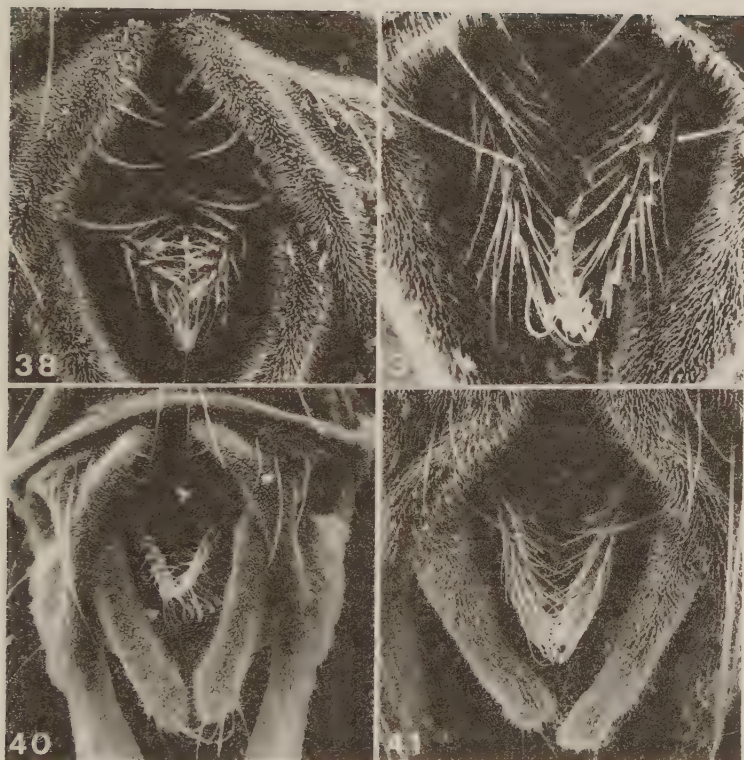
#### ***Chironomus nactus* Walker, 1856**

Described on material from England. In BMNH one pinned male is labelled "Type. Chironomus



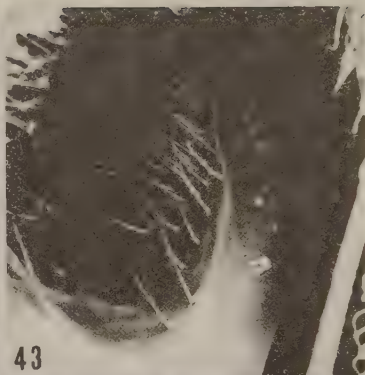
Figs 34-37. Anal point and anal point crests. Dorsal view. - 34. *Micropsectra insignilobus*. X 1200. - 35. *M. apposta*. X 1200. - 36. *M. junci*. X 840. - 37. *M. junci*. X 1200.





Figs 38-41. Hypopygium. Ventral view. - 38, *Micropsectra insignilobus*. X 600. - 39, *M. lindebergi*. X 840. - 40, *M. contracta*. X 336. - 41, *M. junci*. X 600.





Figs 42-45. - 42. *Mirropsectra notescens*. Hypopygium. Ventral view. X 600. - 43. *M. junci*. Microtrichia on appendage 1. Dorsal view. X 2400. - 44. *M. junci*. Spoon-shaped bristles on appendage 2a. X 6000. - 45. *M. lindebergi*. Claw with empodium and pulvilli. X 1200.

nactus Wlk.", "Pres. by F. Walker 56-50". I have designated this specimen as lectotype and labelled it accordingly. Synonymy: *Micropectra notescens* (Walker, 1856), syn.: *Chironomus nactus* Walker, 1856. N.syn.

#### **Chironomus notescens** Walker, 1856

Male described on material from England. In BMNH one pinned male is labelled "Type. Chironomus notescens Wlk.", "Pres. by F. Walker 56-50.", "notescens". I have designated this specimen as lectotype and labelled it accordingly. Present status: *Micropectra notescens* (Walker, 1856).

#### **Chironomus occipiens** Walker, 1856

Described on material from England. In BMNH one pinned male is labelled "Type. Chironomus occipiens Wlk.", "Pres. by F. Walker 56-50". I have designated this specimen as lectotype and labelled it accordingly. Synonymy: *Micropectra notescens* (Walker, 1856), syn.: *Chironomus occipiens* Walker, 1856. N.syn.

#### **Chironomus effectus** Walker, 1856

Male described on material from England. In BMNH one pinned male is labelled "Type. Chironomus effectus Wlk.", "Pres. by F. Walker 56-50". I have designated the specimen as lectotype and labelled it accordingly. Synonymy: *Micropectra notescens* (Walker, 1856), syn.: *Chironomus effectus* Walker, 1856. N.syn.

#### **Chironomus praecox** Wiedemann, in Meigen, 1818

Described under the heading "Chir. praecox Wied". In the preface of this work Meigen (1818: VIII) states the following: "Beschreibungen, die nicht von mir selbst herrühren, ist der Name des Verfassers beigefügt". I therefore consider the author of this species to be Wiedemann and not Meigen. In NMW one pinned male is labelled "praecox m. Coll. Wiedem.", "Type", "praecox" followed by some indistinct letters and "Kiel", "Micropectra praecox Wied.=brunnipes Ztt". This specimen from Germany, Kiel (Type locality), leg. Wiedemann, I have designated as lectotype and labelled accordingly. Synonymy: *Micropectra junci* (Meigen, 1818), syn.: *Chironomus praecox* Wiedemann, 1818. N.syn. Cf. p. 131.

#### **Tanytarsus (Micropectra) tetratomus** Kieffer, 1911

Male and female described on material from Germany, leg. A. Thienemann. The material was obtained by hatching. In IRSN (coll. Types de Kieffer) on male is labelled "Micropectra tetratomus", "Type de Kieffer", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer", "Micropectra tetratomus K.". This specimen lacks hypopygium. In the same collection there are two mounted hypopygia. The mount is labelled "Micropectra tetratomus", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer". I have designated the second hypopygium, counted from the pin, as lectotype and labelled it accordingly. The position of the lectotype is also marked by a drawing placed on the pin. Synonymy: *Micropectra notescens* (Walker, 1856), syn.: *Tanytarsus (Micropectra) tetratomus* Kieffer, 1911. N.syn.

#### **Tanytarsus (Micropectra) trivialis** Kieffer, 1911

Male and female described on hatched material from Germany (leg. A. Thienemann). In IRSN (coll. Types de Kieffer) two hypopygia are mounted on one microscopic slide labelled "Micropectra trivialis K.", "Micropectra trivialis K.", "R.I.Sc.N.B. 18.073 Coll. et det., M. Goetghebuer", "Type de Kieffer". I have designated the hypopygium to the right, as seen from the labels, as lectotype and labelled it accordingly. The position of the lectotype is also marked by a drawing placed on the microscopic slide. The lectotype is morphologically extremely similar to *M. apposita* and to the specimens from Borstbäcken. Thienemann (1912: 42) states that he hatched this species from a small stream in Germany, Sauerland. On morphological and ecological grounds I consider *Tanytarsus (Micropectra) trivialis* Kieffer to be conspecific with *M. apposita* (Walker, 1856).

#### *Acknowledgements*

I am very grateful to Dr. E. J. Fittkau, Plön, Dr. F. Reiss, Plön and prof. L. Brundin, Stockholm, for having placed at my disposal their large material of this group and for valuable discussions. I have also had access to their extensive notes on systematics and ecology of the species in this group. I am grateful to Dr. B. Lindeberg, Helsinki, for the loan of a large material from northern Fennoscandia. I wish to thank Prof. B.-O. Landin, Lund, for valuable discussions. Finally, I am grateful to the curators of the museums listed below for the loan of type-material and for their

kindness to answer my inquiries. This study was financially supported by the Swedish Natural Science Research Council.

#### Abbreviations

|       |                                                                                       |
|-------|---------------------------------------------------------------------------------------|
| BMNH  | British Museum (Natural History), London, England                                     |
| CNC   | Canadian National Collections, Entomology Research Institute, Ottawa, Ontario, Canada |
| IRSN  | Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium                |
| LUZI  | Entomologiska Muséet, Zoologiska Institutionen, Lunds Universitet, Lund, Sweden       |
| MNHN  | Muséum National d'Histoire Naturelle, Paris, France                                   |
| MNHUB | Museum für Naturkunde der Humboldt-Universität zu Berlin, Berlin, DDR                 |
| MNM   | Magyar Nemzeti Múzeum – Természettudományi Múzeum, Budapest, Hungary                  |
| NMG   | Naturhistoriska Muséet, Göteborg, Sweden                                              |
| NMW   | Naturhistorisches Museum, Zoologische Abteilung, Wien, Austria                        |
| ZMUH  | Zoological Museum, University of Helsinki, Finland                                    |
| ZMUO  | Zoologisk Museum, Universitetet i Oslo, Oslo, Norway                                  |

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# *Micropsectra brundini* n.sp. (Diptera: Chironomidae) and geographical variation in the *Micropsectra insignilobus* aggregate

LARS SÄWEDAL

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The imago ♂ of *Micropsectra brundini* n.sp. from Greenland is described. Together with *M. insignilobus* Kieffer and *M. lindebergi* Säwedal the new species form a species aggregate in the *notescens*-group. The geographical variation of the *insignilobus* aggregate is discussed.

KEY WORDS: Diptera, Chironomidae, *Micropsectra*, taxonomy, geographical variation, distribution, Europe, Greenland.

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In a recent paper the author was able to demonstrate that the species *Micropsectra insignilobus* Kieffer sensu auctt. consisted of two morphological similar species, *Micropsectra insignilobus* Kieffer and *M. lindebergi* Säwedal. The study of a large material from many localities (Säwedal 1976: 111, 115) made the delimitation of these two species possible. Of decisive importance were two sympatric and synchronous populations from Lake Kilpisjärvi. These samples were collected by Dr B. Lindeberg. He noted small morphological differences between the two populations (Lindeberg 1970:307). They were called *Micropsectra* sp. I (= *M. lindebergi*) and *M. sp. II* (= *M. insignilobus*). The study of a sample with *Micropsectra* from Greenland gave reason for a closer study of the geographical variation in these two species. This study showed that the material from Greenland consisted of an undescribed species closely related to *M. insignilobus* and *M. lindebergi*. The species is here described under the name *Micropsectra brundini* n.sp.

The analysis of intraspecific geographical variation within groups of sibling species is difficult because one can never be absolutely certain that the different samples are conspecific. The analysis of samples from sympatric and synchronous male swarms has been shown to be a valuable method for separating sibling species (Lindeberg 1964, 1967). For *M. insignilobus* and *M. lindebergi*

it was possible to identify allopatric populations after finding the diagnostic characters in two sympatric and synchronous populations (Säwedal 1976). In fact these minute diagnostic characters were most pronounced in the sympatric populations.

In this study of the geographical variation within the *insignilobus* aggregate I have been forced to limit my study to the males because of lack of material of larvae, pupae and females. Because of the morphological similarity between the species, most characters used in this study are numerical. The abbreviations used are those of Hirvenoja (1973:347). Methods for measuring AR, LR(P<sub>1</sub>) and LR(P<sub>11</sub>) follow Schlee (1966:184).

*M. insignilobus* and *M. lindebergi* seem to be univoltine. They emerge from May to the beginning of July. One specimen of *M. lindebergi* collected in September at Lake Puruvesi is the only indication of a second generation that I have found in my material. *Micropsectra brundini* is univoltine and emerges during June and the beginning of July. Univoltinism facilitates the study of geographical variation since no seasonal variation have to be considered.

## Geographical variation

### *Micropsectra lindebergi*

Only known from three lakes in Finland, one in Germany and two in Sweden (fig. 1).

Tab. 1. *Micropsectra lindebergi*. Values of AR, LR(P<sub>1</sub>), LR(P<sub>n</sub>) and length of appendage 2a for different local populations.

| Locality                  | N  | Wing length, mm | AR        | LR(P <sub>1</sub> ) | LR(P <sub>n</sub> ) | 2a $\mu$ m |
|---------------------------|----|-----------------|-----------|---------------------|---------------------|------------|
| <i>Finland</i>            |    |                 |           |                     |                     |            |
| 5 Inarijärvi, Lintusaaret | 6  | 3.1             | 1.50      | 1.31                | 0.53                | 65         |
|                           |    | 2.8–3.2         | 1.38–1.56 | 1.29–1.33           | 0.51–0.54           | 59–73      |
| 5 Inarijärvi, Siejdlassa  | 10 | 3.1             | 1.48      | 1.32                | 0.53                | 66         |
|                           |    | 3.0–3.3         | 1.39–1.58 | 1.29–1.33           | 0.51–0.54           | 59–73      |
| 5 Inarijärvi, Ukonselkä   | 6  | 3.0             | 1.47      | 1.30                | 0.53                | 67         |
|                           |    | 2.8–3.1         | 1.40–1.50 | 1.24–1.35           | 0.50–0.55           | 60–73      |
| 4 Kilpisjärvi             | 20 | 2.95            | 1.49      | 1.29                | 0.52                | 66         |
|                           |    | 2.8–3.1         | 1.30–1.56 | 1.24–1.34           | 0.49–0.54           | 59–72      |
| 10 Puruvesi, Myhkiö       | 4  | 2.7             | 1.40      | 1.33                | 0.53                | 60         |
|                           |    | 2.6–2.8         | 1.34–1.50 | 1.29–1.35           | 0.51–0.54           | 54–64      |
| 10 Puruvesi, Särkänseleä  | 2  | 2.7             | 1.41      | 1.38                | 0.52                | 65         |
|                           |    | 2.7             | 1.39–1.43 | 1.38                | 0.52                | 65         |
| <i>Germany</i>            |    |                 |           |                     |                     |            |
| 14 Stechlinsee            | 11 | 3.2             | 1.51      | 1.30                | 0.50                | 60         |
|                           |    | 3.0–3.5         | 1.41–1.57 | 1.26–1.35           | 0.48–0.51           | 50–69      |
| <i>Sweden</i>             |    |                 |           |                     |                     |            |
| 12 Vättern                | 2  | 2.6             | 1.36      | 1.31                | 0.52                | 61         |
|                           |    | 2.6             | 1.35–1.37 | 1.31                | 0.52                | 59–62      |
| 7 Stora Bläsjön           | 4  | 2.9             | 1.38      | 1.30                | 0.53                | 66         |
|                           |    | 2.79–2.99       | 1.31–1.44 | 1.29–1.32           | 0.51–0.54           | 65–67      |

I have not found this species among *Micropsectra* material from other localities although a large material has been studied. *M. lindebergi* differs from *M. insignilobus* in the characters mentioned by Säwedäl (1976:113). It must be noted that in all specimens studied only one of the characters AR, LR(P<sub>1</sub>) and LR(P<sub>n</sub>) have been found to overlap. In most specimens there is no overlapping.

The morphological differences between the different populations are very small – if any – and hence there seems to be no geographical variation in the values of AR, LR(P<sub>1</sub>) and LR(P<sub>n</sub>) (Tab. 1).

#### *Micropsectra insignilobus*

Known from more localities than *M. lindebergi* and probably has a wider distribution. It is known from lakes in Finland, Norway and Sweden (fig. 1). The species is rather easy to distinguish from *M. lindebergi* with the help of the characters given by Säwedäl (1976). The characters in which it can be dif-

ferentiated from *M. brundini* n.sp. are mentioned in the description of this species.

The geographical variation in the values of AR, LR(P<sub>1</sub>) and LR(P<sub>n</sub>) is very small or perhaps completely lacking (Tab. 2). No significant morphological differences between the populations were found.

#### *Micropsectra brundini* n.sp.

Fig. 1, Tab. 3.

The specimens studied by me were all collected in Greenland. Oliver (1963:178) reports the species *M. insignilobus* from the Lake Hazen area on Ellesmere Island. Most probably these specimens are *M. brundini*.

The available material (Tab. 3) of this species is insufficient for an analysis of intraspecific geographical variation.

*Type locality*: St. Kvanesö [Great Kvanes Island], Greenland.

*Type material*: Holotype ♂, labelled "191631, Greenland, St. Kvanesö, 19.VI.1975, leg. Claus Lindegaard". Holotype, mounted on slide in euparal,

Tab. 2. *Micropectra insignilobus*. Values of AR, LR(P<sub>i</sub>), LR(P<sub>II</sub>) and length of appendage 2a for different local populations.

| Locality                    | N  | Wing length, mm | AR        | LR(P <sub>i</sub> ) | LR(P <sub>II</sub> ) | 2a μm |
|-----------------------------|----|-----------------|-----------|---------------------|----------------------|-------|
| <i>Finland</i>              |    |                 |           |                     |                      |       |
| 4 Kilpisjärvi               | 16 | 3.1             | 1.66      | 1.42                | 0.57                 | 53    |
|                             |    | 2.9–3.2         | 1.57–1.83 | 1.34–1.51           | 0.55–0.60            | 49–57 |
| 10 Puruvesi                 | 6  | 2.9             | 1.55      | 1.45                | 0.58                 | 52    |
|                             |    | 2.7–3.0         | 1.47–1.67 | 1.36–1.51           | 0.56–0.60            | 44–59 |
| <i>Norway</i>               |    |                 |           |                     |                      |       |
| 1 Hammerfest                | 5  | 3.1             | 1.66      | 1.44                | 0.58                 | 46    |
|                             |    | 2.8–3.2         | 1.60–1.72 | 1.40–1.51           | 0.57–0.60            | 40–48 |
| 2 Alta                      | 12 | 3.0             | 1.65      | 1.46                | 0.58                 | 52    |
|                             |    | 2.8–3.4         | 1.51–1.78 | 1.37–1.49           | 0.56–0.60            | 47–57 |
| 3 Mettevoll                 | 4  | 3.1             | 1.61      | 1.44                | 0.56                 | 52    |
|                             |    | 2.7–3.3         | 1.55–1.67 | 1.40–1.47           | 0.55–0.56            | 47–56 |
| <i>Sweden</i>               |    |                 |           |                     |                      |       |
| 6 Katterjaure               | 4  | 3.1             | 1.66      | 1.49                | 0.57                 | 54    |
|                             |    | 3.0–3.3         | 1.53–1.75 | 1.48–1.51           | 0.55–0.57            | 49–58 |
| 8 Torrön                    | 1  | 2.9             | –         | 1.49                | 0.63                 | 54    |
| 9 Kallsjön                  | 1  | 3.2             | 1.64      | 1.44                | 0.60                 | –     |
| 11 Mälaren, Sotholmen       | 4  | 2.74            | 1.53      | 1.43                | 0.58                 | 48    |
|                             |    | 2.70–2.79       | 1.50–1.58 | 1.40–1.46           | 0.56–0.58            | 45–53 |
| 11 Mälaren, N. Björkfjärden | 8  | 3.1             | 1.62      | 1.44                | 0.58                 | 48    |
|                             |    | 2.9–3.1         | 1.57–1.67 | 1.39–1.49           | 0.57–0.60            | 42–53 |
| 13 Skären                   | 2  | 2.8             | 1.54      | 1.49                | 0.58                 | 47    |
|                             |    | 2.7–2.8         | 1.53–1.55 | 1.47–1.51           | 0.57–0.58            | 45–48 |

in coll. ZSBS, Munich. *Paratypes*: 5 ♂♂ with same data as holotype in the author's collection. The following paratypes have the hypopygia mounted on a separate slide with same label as the rest of the specimen. On the slide with the hypopygium there are notes on the values of AR, LR(P<sub>i</sub>) and LR(P<sub>II</sub>). They are all kept in coll. Lindegaard, Hillerød, Denmark. 1 ♂ labelled "Micropectra insignilobus, 191623 nr. 1, 18.6.1975, Ll. Kvanesö". 1 ♂ labelled "Micropectra insignilobus, 191648". 1 ♂ labelled

"Micropectra insignilobus, 191752 nr. 2, 28.6.1975, Fostersö". 1 ♂ labelled "Micropectra insignilobus, Taseq, 191311 13-7-75". 1 ♂ labelled "Micropectra insignilobus, 191601, 17.6.1975, Kvanefjeld". 1 ♂ labelled "Micropectra insignilobus, 191603 nr. 2, Slørhale sø, 17.6.1976". 1 ♂ labelled "Micropectra insignilobus, 205207, Fostersö, 9.7.1976". All paratypes collected by C. Lindegaard.

*Diagnosis*: Male *M. brundini* n.sp. differ from *M. insignilobus* and *M. lindebergi* in having a group of

Tab. 3. *Micropectra brundini* n.sp. Values of AR, LR(P<sub>i</sub>), LR(P<sub>II</sub>) and length of appendage 2a for different local populations.

|                  | N | Wing length, AR<br>mm | LR(P <sub>I</sub> ) | LR(P <sub>II</sub> ) | 2a μm     |       |
|------------------|---|-----------------------|---------------------|----------------------|-----------|-------|
| <i>Greenland</i> |   |                       |                     |                      |           |       |
| Foster Island    | 2 | 3.3                   | 1.79                | 1.39                 | 0.58      | 71    |
|                  |   | 3.2–3.4               | 1.69–1.88           | 1.39–1.40            | 0.58–0.59 | 71–72 |
| Kvanefjeld       | 1 | –                     | 1.94                | 1.37                 | 0.57      | 76    |
| Kvanesö          | 7 | 3.4–3.7               | 1.79–1.84           | 1.39–1.41            | 0.55–0.61 | 63–78 |
| Slørhale Sø      | 1 | 2.8                   | 1.75                | 1.48                 | 0.55      | –     |
| Taseq            | 1 | 3.1                   | 1.85                | 1.39                 | 0.58      | 73    |



rather numerous microtrichia in median position on basal part of appendage I. It is moreover possible that the smaller number of hook-shaped setae on the legs of *M. brundini* is a constant character that can be used for separating this species from the other two. *M. brundini* differs from *M. lindebergi* in having a higher value of AR, LR(P<sub>I</sub>) and LR(P<sub>II</sub>) and from *M. insignilobus* it differs in having a more slender and longer appendage 2a (63–78  $\mu$ m as against 40–59  $\mu$ m). (The characters separating *brundini*, *insignilobus* and *lindebergi* from the rest of the *notescens*-group are discussed in Sawedal 1976).

**Derivation of name:** Named after Professor Dr. Lars Brundin in recognition of his achievements in taxonomy and systematics of the Chironomidae.

### Description

#### MALE

**Wing length:** 2.8–3.7 mm (n = 11).

**Colour:** Thorax black. Legs and abdomen blackish brown. Halteres rather dark.

**Head:** Frontal tubercles small. AR = 1.69–1.94 (n = 12).

**Thorax:** Acrostichals reach anteprepronotum. Dorsocentrals end between scutellum and anteprepronotum. Preatlars 3–5. Scutellars in one row.

**Wing:** Macrotrichia on distal 3/5 of wing. Fields between C and R<sub>4+5</sub> free from macrotrichia. All veins except Sc, R<sub>2+3</sub>, cross-vein R-M, basal 4/5 of M and basal 3/5 of R<sub>4+5</sub> with macrotrichia. Stem-vein with 1–3 long bristles.

C not projecting beyond R<sub>4+5</sub>. R<sub>2+3</sub> ends half way between R<sub>1</sub> and R<sub>4+5</sub>. fCu under basal part of R-M. An ends under or slightly distal of fCu. Stout false veins along cu veins.

**Legs:** LR(P<sub>I</sub>) = 1.37–1.48 (n = 12). LR(P<sub>II</sub>) = 0.55–0.61 (n = 12). Front tibia with short spur. Combs of middle and hind tibia fused. Claws slender. Pulvilli small. Ta<sub>1</sub> of P<sub>II</sub> with 0–2 hook-shaped setae (sensilla chaetica, Sinneszapfen) on distal 1/10.

**Hypopygium** (cf. fig. 2, Sawedal 1976): Morphologically very similar to that of *Micropsectra insignilobus*. Kieffer and *M. lindebergi* Sawedal. Anal tergite with lateral teeth of small to medium size and 2–3 bristles in median part. Anal tergal bands separated, parallel from basal part of tergite to anal point crests. Anal point crests (cf. fig. 34, Sawedal 1976) poorly developed, in lateral view not projecting or slightly so (cf. fig. 27, Sawedal 1976). Anal tergite without hump in front of anal point crests. Anal point acute with 4–7 lateral bristles on each side.

Appendage I parallel at base, distal part broadly pointed, dorsal with 6–9 bristles and 2 bristles on tip, on basal part with group of microtrichia in median position.

Appendage 1a long and slender, tip reaching beyond that of appendage 1.

Appendage 2 distal with parallel margins, on middle part with transverse ridge, from this to tip with long curved bristles.

Appendage 2a long and slender (63–78  $\mu$ m n = 11) (Tab. 1), on distal part with spoon-shaped lamellar bristles.

Gonostyle slender, distal part transversely truncated.

#### FEMALE

Unknown

#### PUPA

Not known with certainty. Pupal exuviae that are morphologically similar to those of *M. insignilobus* and *M. lindebergi* are known from lakes where adult *M. brundini* have been collected.

### Taxonomic remarks

*M. brundini* fits in my key to the male Palearctic species of the *notescens*-group (Sawedal 1976:110) in the following way:

- 3 (6) Anal point crests poorly developed (op. cit. figs 2, 27, 34). Anal point short and acute. Dististyles (gonostyles) towards tip not gradually narrowing.
- 4 (4c) Appendage I with a few microtrichia in dorso-median position (op. cit.: fig. 2). Ta<sub>1</sub> of P<sub>II</sub> with 2–4 hook-shaped setae on distal part.
- 4a (4b) AR = 1.30–1.58. LR(P<sub>I</sub>) = 1.24–1.38. LR(P<sub>II</sub>) = 0.48–0.55. Appendage 2a 50–75  $\mu$ m. Hypopygium (op. cit. fig. 2) ..... *M. lindebergi* Sawedal
- 4b (4a) AR = 1.47–1.83. LR(P<sub>I</sub>) = 1.34–1.51. LR(P<sub>II</sub>) = 0.55–0.63. Appendage 2a 40–59  $\mu$ m ..... *M. insignilobus* Kieff.
- 4c (4) Appendage I with more microtrichia in dorso-median position. Ta<sub>1</sub> of P<sub>II</sub> with 0–2 hook-shaped setae on distal part.
- 5 (4c) AR = 1.69–1.94. LR(P<sub>I</sub>) = 1.37–1.48. LR(P<sub>II</sub>) = 0.55–0.61. Appendage 2a 63–78  $\mu$ m .. *M. brundini* n.sp.



Fig. 1. Sampling localities referred to in text. 1. Hammerfest. 2. Alta. 3. Mettevoll. 4. Kilpisjärvi. 5. Inarijärvi. 6. Katterjaure. 7. Stora Blåsjön. 8. Torrön. 9. Kallsjön. 10. Puruvesi. 11. Mälaren. 12. Vättern. 13. Skären. 14. Stechlinsee.

- 6 (3) Anal point crests more strongly developed (op. cit. figs 10, 29, 35). Anal point usually longer and not so acute. Appendage I usually with more microtrichia (op. cit. figs 10, 43) in dorso-median position or microtrichia absent (in *M. nepalensis*) Dististyles (gonostyles) gradually narrowing towards tip.

In several species of insects the greatest morphological differences are found when populations from the eastern part of the nearctic region are compared with populations from the western part of the palearctic region. A closer study of such cases often shown that the intraspecific variation of the interlying populations is continuous. Several such examples are found in the Carabidae (Lindroth 1961:79). In the *insignilobus* aggregate I have not been able to demonstrate any geographical variation in the values of

AR, LR(P<sub>i</sub>) and LR(P<sub>ii</sub>). Furthermore, the mosaic-like development of these values in *M. brundini* – when compared with the other two species in the aggregate – clearly demonstrates its specific status.

#### Ecology and distribution

*M. brundini* is only known from oligotrophic lakes in Greenland. The zoobenthos,

physical and chemical properties of these lakes have been investigated by Lindegaard et al. (1978). In this paper *M. brundini* is reported under the name *M. insignilobus* (det. L. Sæwedal). The highest temperatures were found in the shallow lakes where it reached 14–15°C during summer. In the deeper lakes the surface temperatures were 8–10°C for lakes at high altitude and 10–13°C for those at low altitude. The bottom temperatures were 4–6°C lower than at the surface. The lakes had high transparency. In the more shallow lakes it generally exceeded the maximum depth. The bottom material varied from coarse with a large mineral content to finer material with more of organic matter.

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I am very grateful to Dr C. Lindegaard, Hillerød, for loan of *Micropsectra* species from Greenland. For valuable discussions I wish to thank Dr H. Andersson, Dr P. Douwes and Prof. Carl H. Lindroth, all of Lund University. This study was financially supported by the Swedish Natural Science Research Council.

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## Redescription of *Micropsectra borealis* (Kieffer, 1922) n.comb. (Diptera: Chironomidae)

LARS SÄWEDAL and ENDRE WILLASSEN

Säwedal, L., & Willassen, E.: Redescription of *Micropsectra borealis* (Kieffer, 1922) n.comb. (Diptera: Chironomidae).

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The first description of the pupa of *Micropsectra borealis* (Kieffer, 1922) and a redescription of the imago ♂ is presented. The genus *Oeklandia* Kieffer, 1922 is synonymised with the genus *Micropsectra* Kieffer, 1909. The possible synonymy between *Oeklandia* and the genus *Himatendipes* Tokunaga, 1959 is indicated. Together with *M. coracina* (to be treated in a future paper by the senior author) and the *atrofasciata-bidentata*-group, the species form a monophyletic group within the genus *Micropsectra*. The pupa of *M. borealis* shows great variation in the number of lateral setae on the margin of the segments. Often the numbers differ between the two sides of the segment, a state of character not previously reported from the Tanytarsini. The ecology of *M. borealis* is discussed.

**Key Words:** Diptera, Chironomidae, taxonomy, ecology, distribution.

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The monotypic genus *Oeklandia*, with the species *O. borealis*, was described by Kieffer in 1922 on material collected by the Norwegian Expedition to Novaya Zemlya 1921. The genus was regarded as a subgenus of *Stempellina* Bause by Goetghebuer (1937-54: 96). The syntype series of *O. borealis* was studied by Brundin (1949: 850). He reached the conclusion that *Oeklandia* was very closely related to the genus *Paratanytarsus*. In fact, he regarded them as synonyms but did not want to synonymise them formally till the early developmental stages were found. The pupal stage described here clearly shows that *O. borealis* is a member of the genus *Micropsectra* Kieffer, 1909. The species shows some rather aberrant characters in the imaginal stage but the pupa is a typical *Micropsectra*. A phylogenetic study (Säwedal & Reiss in manuscript) shows that *M. borealis* together with *M. coracina* (to be treated in a future paper)

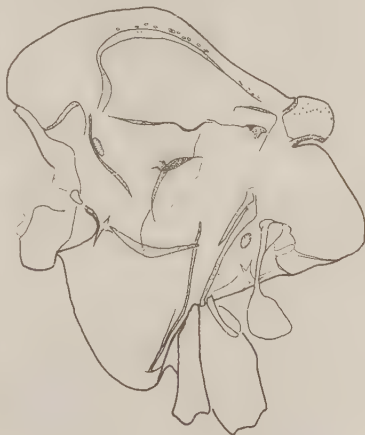


Fig. 1. *Micropsectra borealis*. Thorax. Lateral view.

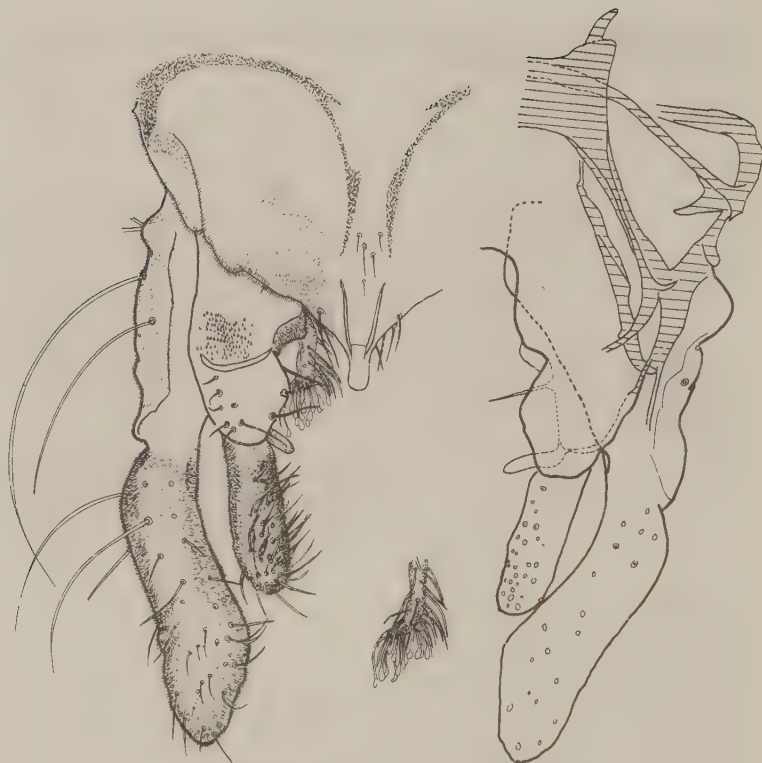


Fig. 2. *Micropsectra borealis*. Hypopygium. Dorsal view.

and the *atrofasciata-bidentata*-group form a monophyletic unit.

Unfortunately it has not been possible to find the type material of *O. borealis*. Brundin (1949: 850, Fig. 237) presents a drawing of the male hypopygium. This drawing was made from the type material and thus it was possible to identify our specimens as *O. borealis*.

Genus *Micropsectra* Kieffer, 1909: 50

Synonymy: *Oeklandia* Kieffer, 1922: 6-7 n.syn., type species (by monotypy): *O. borealis* Kieffer, 1922: 6-7. It is probable that the genus *Himatendipes* Tokunaga, 1959: 21-23 is a junior synonym of *Oeklandia* and thereby also of *Micropsectra*. We have not had the opportunity to study the type material.

**Micropsectra borealis** (Kieffer, 1922: 6-7)  
Figs. 1-3.*Oeklandia borealis* Kieffer, 1922: 6-7.*Type locality:* Lake Lomvand, Belushii Bay, Novaya Zemlya, USSR.*Type material:* From the description by Kieffer (1922: 6-7) and the drawing by Brundin (1949: Fig. 237) it is clear that the material consisted of at least 1 ♂. The material was collected on 16 July 1921. Kieffer deposited his material in the Zoological Museum, University of Oslo.*Material studied:* Norway: Jotunheimen, Steinbuvand, 4 ♂♂, 12 pupal exuviae; Jotunheimen, 1405 m a.s.l., leg. Thomasson. 2 ♂♂ 9.VII.1957, 1 ♂ ??, leg. L. Brundin. The latter 3 ♂♂ only labelled Norway. Sweden: T. lpm., Torneträsk area, Daskojaure, 1 ♂ 25.VII.1952, leg. L. Brundin.*Description**Imago male**Wing length:* 3.5-4.5 mm (n=8).*Colour:* Thorax dark brown. Abdomen, hypopygium and legs light brownish.*Head:* Frontal tubercles short (10 µm), AR = 2.35-2.72 (n = 5).*Thorax* (Fig. 1): Acrostichals reaching antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealars 2-4. Scutellars in one row.*Wing:* Macrotrichia on distal 1/3 of wing. Fields between C and R<sub>1</sub> free from macrotrichia. All veins except Sc, R<sub>2+3</sub>, cross-vein R-M, M, and basal 4/5 of R<sub>4+5</sub> with macrotrichia. Stem-vein with 2-3 long bristles.C not projecting beyond R<sub>4+5</sub>. R<sub>2+3</sub> ends half way between R<sub>1</sub> and R<sub>4+5</sub>. fCu slightly basal of R-M. An ends slightly distal of fCu. Stout false veins along the Cu veins.*Legs:* LR(P<sub>1</sub>) = 0.84-0.90 (n = 8). LR(P<sub>II</sub>) = 0.46-0.49 (n=6). Front tibia without spur. Combs of middle and hind tibia fused in some specimens and separated in others. Spinules in combs separated. Middle and hind tibia each with moderately long spur. Claws rather long, slender and weakly bent. Pulvilli small. Ta<sub>1</sub> of P<sub>II</sub> with 2-3 sensilla chaetica on distal 1/10.*Hypopygium* (Fig. 2): Anal tergite with 4-5 bristles in median part. Lateral teeth absent. Anal tergal bands separated, parallel from basal part of tergite to anal point crests. Anal point crests parallel and of medium height. Their distal parts connected by a thin ridge. Between basal parts with 1-4 small bristles. Anal tergite withoutFig. 3. *Micropsectra borealis*. Abdomen of pupa. Dorsal view.



hump in front of anal point crests. Anal point broad, with parallel margins, tip rounded and basally with 3–5 lateral bristles on each side.

Volsella 1 with nearly parallel margins, distal part broadly rounded, distal-median part with a tendency for being dentated, dorsal with 6–8 bristles and 2 bristles on tip, on basal part with a large group of microtrichia.

Volsella 1a long and rather coarse, towards tip weakly tapering, tip more or less rounded and reaching well beyond that of volsella 1.

Volsella 2 distal with parallel margins. Basal half of median margin concave. Distal half of volsella with long curved bristles.

Volsella 2a of medium length (50–57  $\mu\text{m}$ ,  $n = 5$ ), on distal part with spoon-shaped and lancet-shaped lamellar bristles.

Gonostyle with a sharp bend near base, distal of this with parallel margins, tip transversely cut.

#### *Imago female:*

Unknown.

#### *Pupa*

Length: 6.5–7.25 mm.

*Colour:* Exuvia transparent except for the margins of wing and leg sheaths, the muscle patches, narrow stripes along the margins of tergite IX and the caudolateral combs of segment VIII.

*Cephalothorax:* Frontal tubercles small, each with a long bristle. Thoracic horn about 700  $\mu\text{m}$ , apically pointed. On apical half with bristles on all sides, on basal half with bristles on lateral side. Bristles longer at base (257  $\mu\text{m}$ ) than at apex (89  $\mu\text{m}$ ).

*Chaetotaxy of thorax:* On both sides 6 oral thoracic hairs ( $\text{Oth}_{1-6}$ ).  $\text{Oth}_{1-3}$  are situated in front of and slightly ventral of the thoracic horn.  $\text{Oth}_4$  is situated in median part of prothoracic region.  $\text{Oth}_{5-6}$  are situated close together at the base of the  $\text{P}_1$  sheaths. 4 metathoracic hairs ( $\text{Mth}_{1-4}$ ) present and situated in two groups widely separated from each other.  $\text{Mth}_{1-2}$  are situated half-way between the base of the thoracic horn and the anterior part of the base of the wing sheaths and near the thoracic suture.  $\text{Mth}_{3-4}$  are situated above the anterior part of the base of the wing sheaths, near the thoracic suture.

*Abdomen* (Fig. 3): Tergite I without shagreenation.

Tergite II with a row of anteriorly bent hooks which covers about 1/2 of the segment width. Pseudopods on the same segment. The shagreenation covers the whole tergite except for a field in the anterior part, an area median of the muscle patches to the edge of the tergite and an anal-median patch. Tergite III with two fields of spinules, 28  $\mu\text{m}$  long. The fields are surrounded by shagreenation that in the anterior direction forms a field that nearly reaches the anterior margin of the tergite. Tergite IV with two fields of short spinules, posterior to each field a patch of shagreenation. Tergite V with two fields of short spinules, posterior to each field a patch of shagreenation. Tergite VI in many specimens with two fields of short spinules, posterior of each field a patch of very weak shagreenation, in many other specimens the fields of short spinules are lacking. The variation between these two extremes is continuous. Tergites VII and VIII each with two fields of shagreenation in the anterior part of the tergite immediately median of the muscle patches. Caudo-lateral combs of segment VIII with a row of 6–10 rather coarse spines along the margin and about 2–3 spines superimposed on the comb. Anal lobe with a row of 39–46 filamentous hairs in the males and 41–45 in the females.

#### Chaetotaxy of abdomen:

|   | I | II  | III | IV  | V   | VI  | VII | VIII | IX |
|---|---|-----|-----|-----|-----|-----|-----|------|----|
| D | 3 | 5   | 5   | 5   | 5   | 5   | 5   | 1    | 1  |
| L | – | 4–7 | 4–5 | 4–6 | 5–7 | 5–7 | 4–5 | 4–5  | –  |
| V | ? | 4   | 4   | 4   | 4   | 4   | 4   | 1    | –  |

We have not differentiated between lateral hairs (L) and lateral filamentous hairs (LS) because there is a great variation between these two forms within this species. There is tendency for the number of LS hairs to increase in the posterior direction. A feature not previously reported from the Tanytarsini is that the number of L hairs on the segments vary. Since this variation also occurs between the different sides of the same segment and in the same individual it eliminates the possibility of a mixed material.

#### *Taxonomic remarks*

Male *M. borealis* differs from the other members of this genus in having two types of lamellar setae on volsella 2a, in the shape of the gonostyle and (together with *M. coracina*) in the shapes of volsellae 1 and 1a.

The pupae differ from all other members of this genus known to us in having 4-6 L+LS hairs on segment II, 4-5 on segment III, 4-6 on segment IV and 5-7 on segment V. In the other *Micropsectra* pupae known to us this number is lower (cf. Sæwedal 1976: 113). The variation in the number of L and LS hairs (see above) is in itself a good diagnostic character.

### Ecology

The larvae and pupae of *M. borealis* inhabit lakes in the alpine region of N Europe. No detailed description of their ecology exists.

*General distribution:* Norway, Sweden and USSR.

### Abbreviations

See Sæwedal 1976: Figs. 1, 13. In this paper we have used the term  *volsella*  instead of appendage (cf. Sæwedal 1976, Fig. 1).

*Acknowledgement:* We are very grateful to Dr. E. J. Fittkau and Dr. F. Reiss, both of Munich, for having

placed their material of this species at our disposal. We are also grateful to Prof. L. Brundin, Stockholm, for loan of material and for valuable discussions and to Prof. Ole A. Sæther, Bergen, for having provided us with working facilities. This work was financially supported by the Norwegian Council for Science and the Humanities and the Swedish Natural Science Research Council.

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# Description of *Micropsectra tori* n.sp. from Greenland, with notes on the *recurvata*-group (Diptera: Chironomidae)

LARS SÄWEDAL

Ent. scand.



Säwedal, L.: Description of *Micropsectra tori* n.sp. from Greenland, with notes on the *recurvata*-group (Diptera: Chironomidae).

Ent.scand. 12: 27–30. Lund, Sweden 1 April 1981. ISSN 0013-8711.

The imago ♂ of *Micropsectra tori* n.sp. from Greenland is described and its ecology is briefly discussed. Together with *M. lacustris* Säwedal and *M. recurvata* Goetghebuer it forms the *recurvata*-group of the genus *Micropsectra* Kieffer. It is most probable that the North American species *M. xantha* (Roback) also belongs to this species group. A key to the imagines (♂♂) of the first three mentioned species is presented. The species are illustrated.

**Key words:** Diptera, Chironomidae, *Micropsectra*, taxonomy, distribution. Europe, Greenland, North America.

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The species of the genus *Micropsectra* Kieffer, 1909 form a number of species groups. The *attenuata*-group was treated by Reiss (1969); the *notescens*-group, part of the *recurvata*-group and part of the *borealis*-group have been studied by Säwedal (1975, 1976) and Säwedal & Willassen (1980). The largest species group not yet subjected to a revision is the *atrofasciata-bidentata*-group.

The new species *M. tori*, together with *M. lacustris* Säwedal and *M. recurvata* Goetghebuer, forms the *recurvata*-group of the genus *Micropsectra*. To this group belongs most probably also the North American species *M. xantha* (Roback). In an earlier paper (Säwedal 1976:109) I created the *lacustris*-group for the species *M. lacustris*. A closer study of this species has shown that it is closely related to *M. recurvata* and *M. tori*. Since *M. recurvata* was described first I suggest that the species group containing *M. recurvata*, *M. lacustris*, *M. tori* and possibly also *M. xantha* is called the *recurvata*-group.

The species in the *recurvata*-group are cold stenothermous inhabitants of lakes (*M. lacustris*), or springs, streams and ditches with a humic character (*M. recurvata*). The biotope of *M. tori* is not known.

## Group diagnosis

The ♂♂ of the *recurvata*-group differ from all other *Micropsectra* species in having the following combination of characters: Median volsella long and S-shaped. Anal point long, slender with tip pointed or long, basally broad, on median part tapering with tip pointed. Digitus reaches beyond or far beyond margin of the more or less finger-shaped superior volsella.

Since only the pupa of *M. lacustris* is known it is not possible to give a correct diagnosis for this developmental stage.

No larval material has been available.

## Key to the imagines (♂♂)

1. Lamellar setae of median volsella branched (Säwedal 1975: figs 2, 4). AR low (about 0.95) ..... *M. lacustris* Säwedal
- Lamellar setae of median volsella spoon-shaped (Fig. 1). AR higher (about 1.30–1.73) ..... 2
2. Inferior volsella very slender, its distal part bent in median direction (Reiss 1974: fig. 3) ..... *M. recurvata* Goetghebuer
- Inferior volsella of normal width, not bent in median direction (Fig. 1) ..... *M. tori* n.sp.



Fig. 1. *Micropsectra tori*. Hypopygium. Dorsal view.

***Micropsectra lacustris* Sæwedal, 1975**

The imago ♂ and pupa of this species were described on material collected in Jämtland, Middle Sweden. Recently W. Tobias collected the species in Norway from the River Skonselv at Berlevåg and the River Vestre Risfjordelv in Nordvaranger. In Sweden the species was found in oligohumic and extreme oligohumic lakes situated in the coniferous region and in the transition zone between the coniferous and birch region (Sæwedal 1975: 56).

***Micropsectra recurvata* Goetghebuer, 1928**

The type material of this species has been studied by Reiss (1974). In the same paper he presents a description of the imago ♂ (Reiss 1974: 205).

This species must be regarded as cold stenothermous. It inhabits springs, ditches and streams with a humic character.

It is widely distributed from Central Europe to Northern Fennoscandia, the British Isles, Iceland, The Faroes and Greenland.

***Micropsectra xantha* (Roback, 1955)**

*Calopsectra (Micropsectra) xantha* Roback, 1955: 4.

I have studied the holotype of this species, a male with damaged hypopygium. The species is not conspecific with any other of the species in the *recurvata*-group. Due to its badly preserved hypopygium I hesitate to place it definitely into this species-group. *M. xantha* is described from material collected at Intervale Farm, Concord, Mass., USA.

***Micropsectra tori* n.sp.**

Fig. 1.

*Type locality*: Sö 95, Greenland (Cf. Lindegaard et al. 1978).

*Type material*: Holotype: 1 ♂ mounted on two slides in Euparal. The holotype is labelled: "*Micropsectra tori*

n.sp., Design. L. Sæwæd 1980, Greenland, Sö 95, ref. III, 3.VII.1976, leg. C. Lindegaard, 205202 nr. 1". Both slides labelled similarly.—*Paratypes*: 1 ♂ labelled exactly as holotype except for having "nr. 2" instead of nr. 1 and "Paratypus" instead of Holotypus. 1 ♂ labelled "Micropsectra tori n.sp., Design. L. Sæwæd 1980, Greenland, Sö 95, ref. III, 29.VI.1975, leg. C. Lindegaard, 191765 nr. X". Each of the two paratypes is mounted on two slides which are identically labelled. The holotype and the two paratypes are deposited in Zoologische Staatssammlung, Munich.

*Material studied*: The holotype and the two paratypes. *Diagnosis*: *M. tori* (together with *M. recurvata*) differs from *M. lacustris* in having spoon-shaped setae on median volsella. It differs from *M. recurvata* in having a broader and straight inferior volsella.

*Derivation of name*: The species is named after Tor, one of the ancient Nordic gods.

### Description

#### Imago male

*Wing length*: 2.91–3.09 (n=2).

*Colour*: Head and thorax dark brown. Abdomen and legs brownish.

*Head*: Frontal tubercles very short. AR=1.57–1.73 (n=3).

*Thorax*: Acrostichals reaching antepronotum. Dorsocentrals end between scutellum and antepronotum. Prealars 4–5. Scutellars in one row.

*Wing*: Thickly covered with macrotrichia on distal 3/4. Fields between C and  $R_{4+5}$  free from macrotrichia. All veins except Sc,  $R_{2+3}$ , cross-vein R-M, the basal part of M to cross-vein R-M and the basal 1/4 of Cu with macrotrichia. Stem-vein with 2–3 long setae.

C not projecting beyond  $R_{4+5}$ .  $R_{2+3}$  ends half-way between  $R_1$  and  $R_{4+5}$ , fCu slightly basal of R-M. An ends slightly distal of fCu. Stout false veins along M, An and the Cu veins.

*Legs*:  $LR_1=1.38–1.40$  (n=3).  $LR_2=0.58–0.60$  (n=3).  $LR_3=0.67$  (n=3). Front tibia with short spur. Combs of middle and hind tibia fused, without spurs. Claws slender. Pulvilli small. Ta, of  $P_2$  lacking sensilla chaetica.

*Hypopygium* (Fig. 1): Anal tergite with 3–5 setae in median part. Lateral teeth absent. Bands of anal tergite separated in distal part, on median part nearly connected by a transverse band. Anal tergal bands nearly parallel from transverse band to distal part. Anal point crests rather short, deeply cut into the anal point. In basal part parallel, distally confluent. A few microtrichia between the basal part of anal point crests. Anal

point long, slender with tip pointed and basally with 3–5 setae on each side.

Superior volsella with parallel margins at base, distally slightly bent in median direction with tip rounded. Tip with 2 anteriorly bent setae. Dorsal with 8–10 setae in laterodistal position.

Digitus very long, reaching far beyond margin of superior volsella, tapering from basal part towards the pointed tip.

Inferior volsella with nearly parallel margins, on median part with a weakly developed transverse ridge. On distal 1/3 with long curved setae, the lateral ones of which are placed on prominent tubercles.

Median volsella weakly S-shaped, long (71–79  $\mu$ m, n=2), on distal part with spoonshaped lamellar setae.

Gonostyle well developed, with tip transversely cut.

*Imago female, pupa and larva*: Unknown.

*Ecology*: The material on which the description is based was collected with nets at the margins of lakes. Since I have no pupal or larval material it is not possible to know if the species is an inhabitant of lakes or if it occurs in springs or streams.

*General distribution*: The species is only known from Greenland.

### Systematic remarks

The *recurvata*-group is closely related to the *attenuata*-group (sensu Reiss 1969) and *M. roseiventris* Kieffer. These taxa all have medium volsella and/or inferior volsella of male more or less bent in an S-shaped manner or with a clear tendency for this. Another character that possibly binds these three taxa together is the joint possession of anal combs that are deeply cut into the anal point. The species in the *attenuata*-group together with *M. roseiventris* differ from the *recurvata*-group in having a more or less reduced digitus.

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# Description of *Nidnurbia* n. gen. with notes on the distribution of *Micropsectra* Kieffer (Diptera: Chironomidae)

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Säwedal, L.: Description of *Nidnurbia* n. gen. with notes on the distribution of *Micropsectra* Kieffer (Diptera: Chironomidae).

Ent. scand. 13: 317–320. Lund, Sweden 15 September 1982. ISSN 0013-8711.

The monotypic genus *Nidnurbia* n. gen. is described. The genus belongs to the tribe Tanytarsini of the subfamily Chironominae. A redescription of *N. capicola* (Freeman, 1955) n. comb. from the Cape Province, South Africa, is presented. The species was described as a member of the genus *Micropsectra* Kieffer, 1909 by Freeman. A study of the type material revealed that it is not closely related to *Micropsectra*. This fact is of zoogeographical interest because it drastically alters the concept of *Micropsectra* distribution. It is found, when *N. capicola* is excluded, that *Micropsectra* displays a Holarctic distributional pattern. The great majority of species occur in this region. Only a small number transgress into the Oriental region. No species has been reported from the Neotropical and Australian regions.

Key words: Diptera, Chironomidae, Tanytarsini, *Nidnurbia*, *Micropsectra*, taxonomy, South Africa, Afrotropical region, Oriental region, Holarctic region.

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The new monotypic genus *Nidnurbia* with the species *N. capicola* (Freeman, 1955) n. comb., is studied as part of a revisionary work on the genus *Micropsectra* Kieffer, 1909. References to earlier parts of this revision are given by Säwedal 1981a and Säwedal & Willassen 1980. The genus belongs to the tribe Tanytarsini in the subfamily Chironominae.

Freeman (1955: 379–380) described the species under the name *Micropsectra capicola*. He pointed out, however, that "this species is not completely typical of the genus because the combs ... but as it is in other ways a perfectly normal species of *Micropsectra* I prefer to leave it there rather than erect a new genus". There are, however, many other taxonomically more important dissimilarities. In fact, *N. capicola* is a rather distant relative of the *Micropsectra* species. These facts made it necessary to remove the species from *Micropsectra*. A further impetus was the zoogeographical complications in having a "*Micropsectra*" species listed as occurring in South Africa. *Nidnurbia capicola* did not fit into any existing genus. The erection of a new genus was thus found necessary. The morpho-

logical distinctiveness of the imago justifies a description, even if this has to be based on the male imago only due to the meager possibilities of obtaining larval and pupal material. Unfortunately, it has not been possible to reveal the phylogenetical relationships of the new genus due to this lack of knowledge of the early developmental stages.

Freeman & Cranston (1980: 200) in their catalogue of the Diptera of the Afrotropical region erroneously listed the name *Micropsectra capicola* as a new combination. The species was described as *Micropsectra capicola* by Freeman in 1955. The report of this single "*Micropsectra*" species from the Afrotropical region may lead to wrong zoogeographical conclusions. For example, it is obvious that Fittkau (1980: 142), who quotes Freeman & Cranston (1980) regards *Micropsectra* as a genus common to the Palearctic and the Afrotropical regions. The removal of *N. capicola* from *Micropsectra* means that there is no *Micropsectra* species occurring in the Afrotropical region. The distribution of the genus is thus confined to the Nearctic and Palearctic regions with a small number of species occurring in

the Oriental region. A more thorough treatment of the distribution will be presented in a future paper.

The material forming the base for the description by Freeman (1955: 379–380) and for the present paper was collected during the Lund University South African Expedition in 1950–51.

The terminology used in this paper follows Sæwedal (1981b: 123–124, fig. 4).

### *Nidnurbia* n. gen.

*Type species: Nidnurbia capicola* (Freeman, 1955: 379–380).

*Diagnostic characters:* *Nidnurbia* differs from other Tanytarsini genera known to me in having a thin transverse sternapodeme without any protrusions. The transverse sternapodeme and the lateral sternapodemes are evenly confluent into each other without showing any transgressional zone. The shape of the anal tergal bands may also constitute a diagnostic character for the genus.

*Derivation of name:* The genus name is an anagram; it is named after Professor Dr. Lars Brundin in gratitude of all the help and encouragement he has offered me.

### Description

#### *Imago* ♂

Medium sized species.

Eyes reniform. Antennal flagellum with 13 flagellomeres.

Wing, except for most basal part, densely covered with macrotrichia. C not projecting beyond R4+5. R2+3 ends close to R1. fCu distal of R–M. An ends under fCu. Stout false veins along both sides of Cu and along M3+4 and Cu1.

Front tibia with short spur, about 8  $\mu$ m. Middle and hind tibia each with two narrowly separated combs which cover about 3/4 of the circumference. Combs without spurs. Claws rather small and slender. Pulvilli absent.

Hypopygium with 3 or 4 appendages (cfr. section morphological remarks). Anal tergal bands separated. Anal tergal setae numerous and situated in a median patch on tergite. Anal combs present. Anal point well developed. Transverse sternapodeme thin and without any protrusions, evenly confluent with lateral sternapodeme.

### Description of the species

*Nidnurbia capicola* (Freeman) n. comb.

Fig. 1

*Micropsectra capicola* Freeman, 1955: 379–380.

*Type locality:* South Africa, Cape Province, Maanshijnekop 7 miles E Hermanus.

*Type material:* *Holotype:* 1 ♂ mounted on two slides; the slide with complete body, except for hypopygium, is mounted in Euparal. Slide with hypopygium is labelled "Micropsectra capicola Freeman, Hermanus: Cape Province. ♂ genitalia of holotype." The square label surrounded by a thick red line. The other slide with the rest of the animal is labelled "S. Africa. Hermanus. Waterfall about 10 km E of town. 21.XII.1950, leg. G. Rudebeck" on one label and "Micropsectra capicola Freeman, P. Freeman det., 1955, Holotype" on another label. In the original description the date of collecting is erroneously said to be 21.XII.1954. The holotype is deposited in Zoological Museum, University of Lund, Lund, Sweden.

*Material studied:* The holotype male only.

*Diagnostic characters:* Cfr. diagnostic characters in generic description.

### Description

#### *Imago* ♂

*Wing length:* 2.28 mm.

*Colour:* Description adopted from Freeman who studied dried specimen. Head yellowish brown, pedicel brown. Thorax with yellowish ground colour, stripes dark brown, scutellum, postnotum and sternopleuron brown, prescutellar area pale brown. Legs brown and unmarked. Abdomen yellowish with brown bands at the incisures.

*Head:* Frontal tubercles absent. Eyes not pubescent. AR = 0.65.

*Thorax:* Acrostichals reaching antepronotum. Dorsocentrals ending close to antepronotum. Prealars 2. Scutellars rather few, arranged in one row.

*Wing:* Wing membrane, with exception of the fields between C and M, C and R4+5 and the most basal part of field m, densely covered with macrotrichia. All veins except R2+3, M and the most basal part of Cu, with macrotrichia. Brachiolium with 3 setae.

Venation as in generic description.

*Legs:* LR1 = -. LR2 = 0.62. LR3 = 0.70. Due to damage presence or absence of sensilla chaetica on tarsomeres can not be observed.

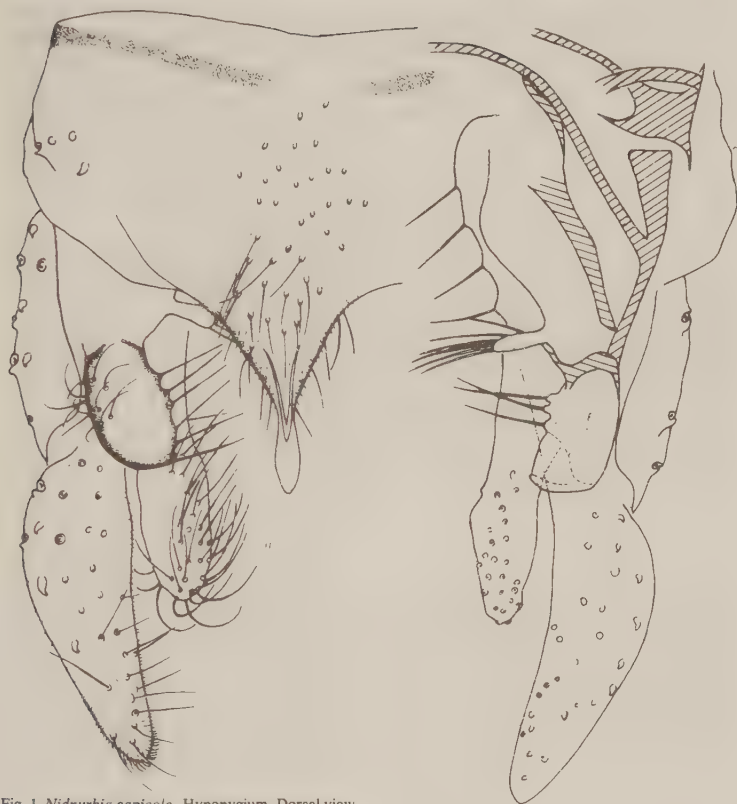


Fig. 1. *Nidnurbia capicola*. Hypopygium. Dorsal view.

*Hypopygium* (Fig. 1): Anal tergite with numerous setae in the median part. Setae covering area from base of anal point to a position close to anterior part of tergite. Posteriolateral part of anal tergite on each side with a group of 3-4 setae. Lateral teeth absent. Anal tergal bands situated on proximal 1/4 of tergite, straight, nearly transverse to longitudinal axis of hypopygium, well separated and lacking longitudinal

portion. Anal point well developed, constricted on basal part, broadest on median part, from there to apex broadly tapering. Anal point crests present, rather long (about 37  $\mu\text{m}$ ) and of medium height.

Transverse sternapodem rather thin, of even width and without any protrusions. Transverse and lateral sternapodemes confluent without showing any transgressional zone.

Superior volsella elongated, nearly parallel to median line. Median and lateral margins convex, tip broadly rounded. Dorsolateral surface with a group of about 8–10 long, curved setae. At median margin, close to tip of volsella, 3 nearly straight setae pointing in median direction. Below median part of volsella, 3 long setae, each on a tubercle, the tubercles being on different levels. No field with microtrichia at base of volsella.

Digitus: Cfr. section morphological remarks.

Median volsella short, 24  $\mu\text{m}$ , in distal part with simple lamellar (?) setae, at anterior margin with 1–2 normal setae.

Inferior volsella long, its lateral margin nearly straight, the median margin concave on basal half and convex on distal half, thus giving distal part a broader appearance. From apex and along distal half of median margin with long anteriorly bent setae.

Gonostylus rather short, its median margin weakly concave, lateral margin convex. Gonostylus broadest on proximal one half. Tip of gonostylus broadly rounded.

Imago female, pupa and larva: Unknown.

#### Morphological remarks

The long finger-shaped structure present under apex of superior volsella may constitute a distally located digitus. A second interpretation is that the structure is a folding of the ventral part of the superior volsella. Unfortunately, it is not possible to decide which of these alternatives is the most probable one because of lack of material. I am, however, inclined to interpret the structure as a true digitus.

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#### Ecology

The conditions under which the only known specimen of *N. capicola* was collected were described in the following way: "Dry heath under the mountain. Deep ravine with two small streams coming down the steep rock walls as waterfalls. Moist and cool locality. In the innermost part, the rocks were covered by wet thickets of mosses and ferns. Dense and rather tall tree vegetation" (Hanström, Brinck & Rudebeck 1955: 77).

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# Distribution of leg sensilla chaetica in male Chironomidae (Diptera) and its phylogenetic significance

LARS SÄWEDAL

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The hair-like sense organs found on the tarsomeres in Chironomidae can be classified as sensilla chaetica (SCh). They are of three different types and there are indications on the presence of a fourth type. SCh are present in many groups of insects but the particular shape of their tips in one of the types developed within the Chironomidae seems to be unique. They are present in males of all subfamilies except Aphroteniinae and Telmatogetoninae. Within the different evolutionary lines two trends are found in the distribution of the studied type of SCh: (1) In the plesiomorphic taxa SCh are found on  $P_2$  while in the more apomorphic ones they are found on  $P_2$  and  $P_3$  or only on  $P_3$ . (2) The position of the SCh tends to move from a basal position in the plesiomorphic taxa towards a more apical position in the more apomorphic taxa. These two trends are found in several evolutionary lines. This tendency for a parallel development restricts the phylogenetic use of these trends to taxa already delimited by synapomorphies.

Key words: Diptera, Chironomidae, morphology, phylogeny, tarsal sensilla chaetica.

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The occurrence of hairs presumed to be sense organs in Chironomidae was first observed by Kieffer (1910), who found them localized to the first tarsomere ( $ta_1$ ) of the middle leg ( $P_2$ ) in female *Tanytarsus clavatifarsis* Kieffer (Chironominae). Their presence in this subfamily was rediscovered by Reiss (1969) from male *Parapsectra uliginosa* Reiss. In this species they are localized to the distal 3/4 of the first tarsomere of the middle leg. Fittkau (1962) discussed their presence on the proximal part of  $ta_1$  of  $P_2$  in female Tanypodinae, and they are also mentioned by Roback (1971).

The taxonomic importance of hair-like organs on the tarsomeres was recognized by Hirvenoja (1973) in his revision of the genus *Cricotopus* van der Wulp and its allies in the Orthocladiinae. He found that their number had a great diagnostic value at the species level, and their distribution on the tarsomere could be taxonomically important at higher levels. He also found a marked sexual dimorphism in the number and distribution of these structures. In the females they were

more numerous and their distribution on the tarsomere wider. Saether used the distribution and number of these organs as a taxonomic character in works dealing with Chironominae and Orthocladiinae (1976, 1977a, 1977b). In the tribe Tanytarsini their occurrence has been studied in the genera *Camposia* Reiss, *Micropsectra* Kieffer, *Nimbocera* Reiss, *Paratanytarsus* Thienemann & Bause, *Rheotanytarsus* Thienemann & Bause and *Tanytarsus* van der Wulp (Reiss 1972, Säwedal 1976, Säwedal & Langton 1977).

The terminology used in connection with hair-like organs in Chironomidae is not uniform. Reiss (1969) called them Hakenborsten, and they have been described in such terms as Sinneszapfen (Hirvenoja 1973), hook-like chemoreceptors (Roback 1971) and hook-shaped bristles (Säwedal 1976) as well. Schlee (1968) discussed the general morphology of male chironomid imagines. He reported the presence of "hyaline Sinnesborsten" from various parts of the body. Serra-Tosio (1970), in a study of the antennae of





Figs. 1-2. Sensilla chaetica on  $ta_1$  of  $P_{III}$ . — 1, *Syndiamesa hygropetrica* (Kieffer). X 800. — 2, *Potthastia gaedii* (Meigen). X 800. — Both photographs taken in Nomarski interference phase contrast illumination.

the Diamesini, also found this type of chaetae on the distal part of the antenna. He classified them as sensilla chaetica. Saether (1976: 5), in accordance with this terminology, was the first to call the hair-like organs on the tarsomeres sensilla chaetica.

The ultra-structure of the hair-like organs in Chironomidae have not yet been investigated, and there is no evidence which explains their function. However, they have often been described as chemoreceptors (Roback 1971, Hirvenoja 1973), based on their morphology. Their shape is similar, but at least one of the types found is not identical to structures found in other

groups, and these sensillae have been shown to be chemoreceptors.

A review of the structure of mechanoreceptors in arthropods has been provided by McIver (1975) and of chemoreceptors by Slifer (1970). Studies have been made on the physiology of mechanoreception (Schwarzkopf 1964) and chemoreception (Hodgson 1964).

In the following the hair-like organs in Chironomidae will be called sensilla chaetica (SCH) since this term has been used before in taxonomic studies on this family and so far there is nothing to suggest that this practise is wrong. Due to the discovery of two new types of SCH

and indications for the existence of a third type, the need for new terms has occurred.

This investigation was initiated when I found, in a sample of *Diamesini* species, great differences in the number as well as in the position of SCh on the tarsomere 1 both between species and genera.

## Methods

Specimens were mounted on slides in Euparal according to the method described by Schlee (1966). The presence of SCh, as well as their number, length and position was studied under a microscope with Nomarski interference phase-contrast illumination. The specimens studied by SEM were fixed, dehydrated in an alcohol series and dried in the air.

To facilitate the counting of the chaetae on each tarsomere and to make a comparison between different specimens possible, the tarsomeres were looked upon as being divided into five equal parts (= positions). See Fig. 7.

## Results

### General results

The most common type of SCh on the legs in Chironomidae are short, 5–26  $\mu\text{m}$ , and under the light microscope they have a hook-like appearance (Figs. 1, 2). SEM reveals that their apical portion is not a single point, but usually split into 8 tips (Figs. 3–6). They are <1  $\mu\text{m}$  thick. The surface is smooth, with no visible pores, and there are longitudinal ridges, SEM showed sunken areas in the apical part (Figs. 4, 6), suggesting that the cuticle of these areas is thinner.

Sensillae of this type are found in different parts of the body, but this study has been confined to those on the first tarsomere ( $\text{ta}_1$ ). They can have different positions (Figs. 1, 2, 7). In each species there is a slight variation in the number of sensillae, and usually there are more in the females than in the males, e.g. in *Micropectra insignilobus* Kieffer the males has 2–4 and the females 19–20. In the same species the sensillae are normally of the same length. The bent apical portion is always directed distally

and in the same direction as all the sensillae. I have not found this type of sensillae in any of the quite numerous species of Ceratopogonidae, Chaoboridae, Culicidae and Simuliidae that have been studied.

In the Tanypodinae genera *Clinotanypus* Kieffer and *Coelotanypus* Kieffer there is another type of SCh. These organs look like normal setae except for that their apices are transversely cut. On lateral margin of apex a thin thread. I have not studied the ultra-structure of this type of SCh and they are not treated in this paper. A similar type is found in some of the studied Ceratopogonidae and Simuliidae species.

Another type of SCh is found in *Thalassomyia frauenfeldi* Schiner, a species belonging to Telmatogetoninae. These SCh have a broad, finger-shaped, hyaline base which in light microscope appears to be without longitudinal ridges. Apex of base on lateral margin with a thin thread, similar to that found in *Clinotanypus* and *Coelotanypus*.

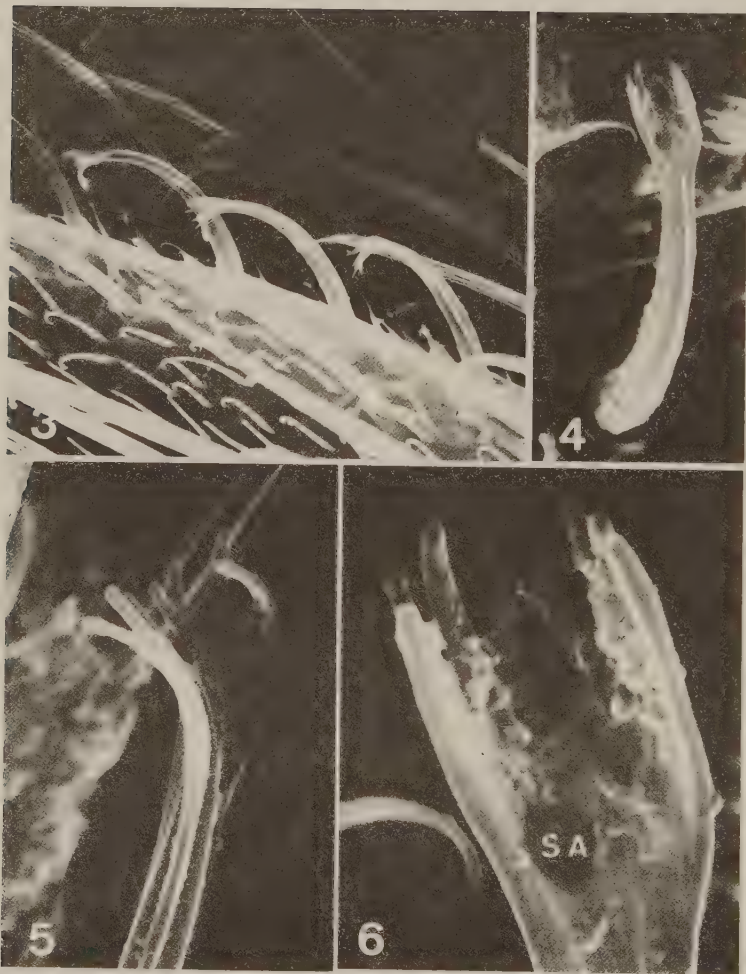
There are indications for the existence of still another type of SCh. In the Tanypodinae genera *Telmatopelopia* Fittkau and *Ablabesmyia* Johannsen there are long (40  $\mu\text{m}$ ) sensillae (?) that nearly look like normal setae. Their apical portion is suddenly narrowing and continues like a thin thread of the same type as that found in *Thalassomyia*, *Clinotanypus* and *Coelotanypus*. This shape may have been caused by mounting procedures and only ultra-structural investigations can confirm if these structures are SCh.

### Subfamily Telmatogetoninae

I have studied the species *Telmatogeton remanei* Remmert and *Thalassomyia frauenfeldi* Schiner. The former species has no SCh while the latter has 4–6 SCh on  $\text{ta}_1$  of  $\text{P}_2$ . The SCh are found in position 5 and are 15  $\mu\text{m}$  long. The shape of these SCh differs from that found in all other Chironomidae (cf. the section "General results").

### Subfamily Tanypodinae

I have found SCh of two different types within this subfamily. In the genera *Clinotanypus* and *Coelotanypus* there occurs the aberrant form described in the section General results. SCh of the



Figs. 3-6. Sensilla chaetica on  $ta_1$  of  $P_{II}$ . — 3. *Micropsectra notescens* (Walker). SEM 2280X. — 4. *Micropsectra contracta* Reiss. SEM 6000X. — 5. *M. contracta*. SEM 12000X. — 6. *M. contracta*. SEM 24000X. — SA = sunken area.

Table 1. Number, length and position of sensilla chaetica on  $ta_1$  of  $P_3$  in Tanypodinae and Podonominae.

|                                          | N   | Length ( $\mu$ m) | Position |
|------------------------------------------|-----|-------------------|----------|
| Subfamily Tanypodinae                    |     |                   |          |
| <i>Procladius</i> sp.                    | 1-2 | 18                | 1        |
| <i>Tanypus</i> sp.                       | 5   | 20                | 1        |
| <i>T. punctipennis</i> Meigen            | 4   | 20                | 1        |
| <i>T. vilipennis</i> Kieffer             | 4   | 20                | 1        |
| Subfamily Podonominae                    |     |                   |          |
| <i>Trichotanypus posticalis</i> (Lundb.) | 2   | 18                | 5        |

normal Chironomidae type in position 1 on  $P_2$  are found in members of the genera *Procladius* Skuse and *Tanypus* Meigen (Tab. 1). The length varies between 18 and 20  $\mu$ m.

#### Subfamily Aphroteniinae

Two Aphroteniinae species have been studied, *Paraphrotentia excellens* Brundin and one unidentified species. In none of these SCH are found.

#### Subfamily Podonominae

SCH of the normal Chironomidae type have been found only in *Trichotanypus posticalis* (Lundb.). They are found in position 5 on  $P_2$  and are 18  $\mu$ m long (Tab. 1). SCH of other types have not been found.

#### Subfamily Buchonomyiinae

According to Brundin & Saether (1978: 270) *Buchonomyia burmanica* Brundin & Saether lacks SCH. Fittkau (1955) does not mention if SCH are present or absent in *B. thienemanni* Fittkau. In my material of this species they are absent.

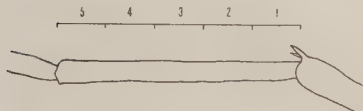


Fig. 7.  $Ta_1$  of leg. The division into five positions is shown. The positions are numbered from basal part towards distal part of the tarsomere.

#### Subfamily Diamesinae

The phylogenetic relationships of this subfamily are discussed by Brundin (1966: 362-373) who recognized the following tribes (cf. Fig. 8): Lobodiamesini, Harrisonini, Boreoheptagyni, Heptagyni, Diamesini and Protanypini. Members of the latter four tribes are dealt with in the present study.

##### Tribe Boreoheptagyni

I have studied two species that belong to this tribe, *Boreoheptagynia legeri* (Goetghebuer) and *B. ? monticola* (Serra-Tosio). They possess SCH of the normal Chironomidae type on  $P_2$  and  $P_3$  where the SCH are found in position 5. They are 13  $\mu$ m long (cf. Tab. 3).

##### Tribe Heptagyni

This tribe contains the five genera *Heptagynia* Phil., *Paraheptagynia* Brundin, *Reissia* Brundin, *Limaya* Brundin and *Maoridiamesa* Pagast. I have studied members of the latter four genera.

The phylogeny of the tribe is presented by Brundin (1966: Fig. 526). The species of this tribe have 1-12 SCH on  $P_3$  (Tab. 2). SCH are lacking on the other legs. The number of SCH in *Reissia antiqua* (Brundin) is uncertain since only a damaged specimen that apparently lacks SCH has been studied. The SCH are found in positions 2-3 or 3, 19  $\mu$ m long.

##### Tribe Diamesini

Consists of 10 genera (Saether 1977: 64-73). I have studied 17 species belonging to 7 genera (Tab. 2., Fig. 9). The taxonomy of the imagines and pupae have been treated by Pagast (1947),

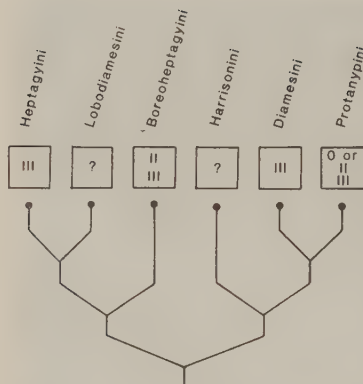


Fig. 8. Distribution of sensilla chaetica and phylogenetic relationships of the Diamesinae. Roman numerals within a square indicate the pair of legs on which sensilla chaetica are found. A ? indicates taxa not studied. The figure is based on Brundin 1966: Fig. 526.

Serra-Tosio (1968, 1971) and Hansen & Cook (1976). Serra-Tosio presents two phylogenetic analyses of the Diamesini (1968: 157–162, 1971: 298–302; cf. Fig. 9). A serious drawback with these analyses is that no synapomorphy is presented for the Diamesini, i.e. it is not shown to be a monophyletic unit. Also within the tribe there are groups for which the monophyletic status is not shown. The group consisting of the genera *Pagastia* Oliver, *Pseudodiamesa* Goetghebuer and *Hesperodiamesa* Sublette is not bound together with a synapomorphy (Serra-Tosio 1968: plate XII). The genera *Lappodiamesa* Serra-Tosio and *Sympotthastia* lack synapomorphies, a fact that theoretically make them impossible to delimit. I have, in spite of these shortcomings, used the figure presented by Serra-Tosio (1968: plate XII) as an outline for my discussions.

In the Diamesini Sch are found only on  $ta_1$  of  $P_3$  (Tab. 2). The variation in number (0–25) and length (5–17  $\mu\text{m}$ ) is considerable, suggesting that they may be important for separating species. In *Pseudodiamesa*, with only two species, these are easily separated by the great difference in the number of Sch. The position of the Sch varies

Table 2. Number, length ( $\mu\text{m}$ ) and position of sensilla chaetica on  $ta_1$  of  $P_3$  in Heptagyini and Diamesini.

|                                          | N     | Length ( $\mu\text{m}$ ) | Position |
|------------------------------------------|-------|--------------------------|----------|
| Tribe Heptagyini                         |       |                          |          |
| <i>Heptagyia annulipes</i> Phil.         | 12    | 19                       | 2–3      |
| <i>Limaya longitarsis</i> Brundin        | ?1    | ?                        | 3        |
| <i>Paraheptagyia cinerascens</i> (Edw.)  | 23    | 19                       | 2–3      |
| <i>Reissia antiqua</i> (Brundin)         | ?     | ?                        | ?        |
| Tribe Diamesini                          |       |                          |          |
| <i>Diamesa aberrata</i> (Lundbeck)       | 16–17 | 5                        | 4        |
| <i>D. arctica</i> (Boheman)              | 1     | 5                        | 3        |
| <i>D. bertrami</i> Edw.                  | 10    | 7                        | 3        |
| <i>D. bohemani</i> Goetgh.               | 9–24  | 7                        | 3        |
| <i>D. davisii</i> Edw.                   | 2     | 7                        | 3        |
| <i>D. incallida</i> (Walk.)              | 4     | 10                       | 5        |
| <i>D. latitarsis</i> Goetgh.             | 7     | 13                       | 4        |
| <i>D. lindrothi</i> Goetgh.              | 6     | 10                       | 3–4      |
| <i>D. thienemanni</i> Kieffer            | 13–25 | 5                        | 3–4      |
| <i>Lappodiamesa brundini</i> Serra-Tosio | 10    | 12                       | 3        |
| <i>Pothastia gaedii</i> (Meig.)          | 16–21 | 8                        | 1        |
| <i>P. longimanus</i> Kieffer             | 2–7   | 14                       | 1        |
| <i>Pseudodiamesa branickii</i> (Now.)    | 0–5   | 16                       | 5        |
| <i>P. nivosa</i> (Goetgh.)               | 16–19 | 14                       | 5        |
| <i>Pseudokiefferiella parva</i> (Edw.)   | 4     | 11                       | 2–3      |
| <i>Sympotthastia zavrelli</i> Pag.       | 20    | 12–17                    | 1–2      |
| <i>Syndiamesa hydropetrica</i> (Kieffer) | 8     | 10                       | 5        |

Table 3. Number, length and position of sensilla chaetica on  $ta_1$  of  $P_2$  and  $P_3$  in Boreoheptagyini and Protanypini.

|                                               | $P_2$ |                       |          | $P_3$ |                       |          |
|-----------------------------------------------|-------|-----------------------|----------|-------|-----------------------|----------|
|                                               | N     | Length<br>( $\mu m$ ) | Position | N     | Length<br>( $\mu m$ ) | Position |
| Tribe Boreoheptagyini                         |       |                       |          |       |                       |          |
| <i>Boreoheptagyia legeri</i><br>(Goetghebuer) | 2     | 13                    | 5        | 1-2   | 13                    | 5        |
| <i>B. ? monticola</i> (Serra-Tosio)           | 1     | 13                    | 5        | 3     | 13                    | 5        |
| Tribe Protanypini                             |       |                       |          |       |                       |          |
| <i>Protanypus caudatus</i> Edw.               | 6     | 10                    | 1        | 6     | 10                    | 1        |
| <i>P. hamiltoni</i> Saether                   | 0     | —                     | —        | 0     | —                     | —        |
| <i>P. morio</i> (Zett.)                       | 6     | 10                    | 1        | 4     | 14                    | 1        |
| <i>P. ramosus</i> Saether                     | 0     | —                     | —        | 0     | —                     | —        |

considerably between the genera and seems to have a phylogenetic significance. Fig. 9 shows that the SCH have a basal position on tarsomere 1 in *Potthastia* and *Sympotthastia*. In *Pseudokiefferiella*, *Lappodiamesa* and *Diamesa* they have a median position. Some *Diamesa* species do have the SCH in a more apical position. In the genera *Pseudodiamesa* and *Syndiamesa* they have an apical position.

Fig. 9 shows that there is a clear pattern in the distribution of SCH on  $ta_1$  in the Diamesini species. The two sister-groups *Potthastia* and *Sympotthastia* have the SCH in position 1 (*Potthastia*) or 1-2 (*Sympotthastia*). The genus *Diamesa* has the SCH in position 3-4, 4 or 5 and the genus *Lappodiamesa* in position 3. *Syndiamesa* and *Pseudodiamesa* possess SCH in position 5. If the place is changed between *Diamesa* and *Lappodiamesa* (Fig. 9) a clear trend can be seen from position 5 in *Pseudodiamesa* to position 1 in *Potthastia*. The direction of this trend and its consequences for the cladogram presented by Serra-Tosio (1968: plate XII) is discussed on p. 21.

#### Tribe Protanypini

In the genus *Protanypus* Kieffer, the only genus within this tribe, there are species with SCH on both  $P_2$  and  $P_3$  as well as species lacking SCH (Tab. 3., Fig. 9). It is interesting to note that the males of the North American species (*P. hamiltoni* and *P. ramosus*) lack SCH while the males of the studied European species (*P. cau-*

*datus* and *P. morio*) have them as have the females of *P. hamiltoni* and *P. ramosus* (cf. Saether 1975).

On  $P_2$  of *P. caudatus* and *P. morio* there are 6 SCH while on  $P_3$  there are 6 and 4, respectively. The SCH have a basal position (1) in both species and on both pair of legs. The lengths of the SCH is 10-14  $\mu m$ .

#### Subfamily Prodiamesinae

This small subfamily consists of the three genera *Monodiamesa* Kieffer, *Odontomesa* Pagast and *Prodiamesa* Kieffer. Members of all three genera have been studied (Tab. 4).

The species of Prodiamesinae all lack SCH on  $P_2$ . On  $P_3$  they have 0-13 SCH in positions 1-2. Their lengths are 11-18  $\mu m$ .

#### Subfamily Orthocladiinae

Species belonging to 30 genera have been examined (Tab. 5., Figs. 10-12). In these species SCH are found on all three pairs of legs, on  $P_2$  and  $P_3$ , on  $P_3$  only, or they are completely lacking. The distribution of SCH in the Orthocladiinae displays no clear trend. One possible trend is that there seems to be a tendency for the more apomorphic taxa to lack SCH. Another weak trend is that found within the *Cricotopus* series (cf. p. 21).

The number of SCH on  $ta_1$  of  $P_3$  varies between 0 and 52, on  $ta_1$  of  $P_2$  between 0 and 16. In *Limnophyes hudsoni*, the only species in this



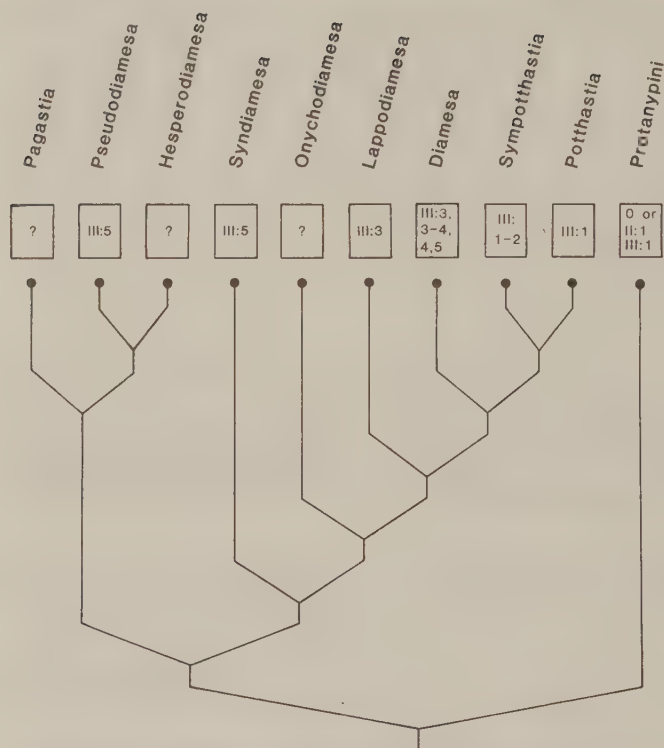


Fig. 9. Distribution of sensilla chaetica and phylogenetic relationships of the tribes Diamesini and Protanypini. Arabic numerals within a square refer to the position on  $ta_1$  where sensilla chaetica are found. See also explanation to Fig. 8. The figure is based on Serra-Tosio 1968: plate XII.

Table 4. Number, length and position of sensilla chaetica on  $ta_1$  of  $P_2$  and  $P_3$  in Prodiamesinae.

|                                   | $P_2$ |                    |          | $P_3$ |                    |          |
|-----------------------------------|-------|--------------------|----------|-------|--------------------|----------|
|                                   | N     | Length ( $\mu m$ ) | Position | N     | Length ( $\mu m$ ) | Position |
| <i>Monodiamesa ekmani</i> Brundin | 0     | —                  | —        | 0     | —                  | —        |
| <i>Odontomesa fulva</i> (Kieff.)  | 0     | —                  | —        | 3-6   | 11                 | 1-2      |
| <i>Prodiamesa delphinensis</i>    | 0     | —                  | —        | 2     | 11                 | 1        |
| <i>P. olivacea</i> (Meig.)        | 0     | —                  | —        | 13    | 12                 | 1-2      |

Table 5. Number, length and position of sensilla chaetica on  $ta_1$  of  $P_1$ ,  $P_2$  and  $P_3$  in Orthocladinae. ? = species not studied. The table is based on the authors own material supplemented by data presented by Hirvenoja (173) and Saether (1976, 1977a).

|                                                                   | N    | $P_2$                 |          | N     | $P_3$                 |          |
|-------------------------------------------------------------------|------|-----------------------|----------|-------|-----------------------|----------|
|                                                                   |      | Length<br>( $\mu m$ ) | Position |       | Length<br>( $\mu m$ ) | Position |
| <i>Acricotopus lucens</i> (Zett.)                                 | 0    | —                     | —        | 7-17  | ?                     | 1-3      |
| <i>Baeoctenus bicolor</i> Saether                                 | 0    | —                     | —        | 19-20 | ?                     | 1-3      |
| <i>Brillia longifurca</i> Kieff.                                  | 0    | —                     | —        | 8-10  | 19                    | 2-3      |
| <i>B. modesta</i> (Meig.)                                         | 0    | —                     | —        | 4-5   | 23                    | 2-3      |
| <i>Bryophaenocladus scanicus</i><br>Br.                           | 0    | —                     | —        | 0     | —                     | —        |
| <i>Bryophaenocladus</i> sp. 1                                     | 0    | —                     | —        | 0     | —                     | —        |
| <i>Bryophaenocladus</i> sp. 2                                     | 0    | —                     | —        | 0     | —                     | —        |
| <i>Chaetocladus britae</i> S  w.                                  | 4    | 13                    | 3        | 6     | 13                    | 2-4      |
| <i>C. suecicus</i> (Kieff.)                                       | 0    | —                     | —        | 4-10  | 13                    | 2        |
| <i>C. laminatus</i> Br.                                           | 0    | —                     | —        | 3     | 13                    | 2-3      |
| <i>Chaetocladus</i> sp. 1                                         | 1    | 7                     | 3        | 1     | 7                     | 2-3      |
| <i>Chaetocladus</i> sp. 2                                         | 1    | 12                    | 3        | 6     | 12                    | 2-3      |
| <i>Corynoneura lobata</i> Edw.                                    | ?    | —                     | —        | 0     | —                     | —        |
| <i>Corynoneura</i> sp.                                            | 0    | —                     | —        | 0     | —                     | —        |
| <i>Cricotopus albiforceps</i><br>(Kieff.)                         | 1-4  | 7                     | 1-2      | 2-6   | 7                     | 1-2      |
| <i>C. ? annulator</i> Goetgh.                                     | 0    | —                     | —        | 6-10  | 7                     | 1-2      |
| <i>C. bicinctus</i> (Meig.)                                       | 0-3  | 5                     | 1        | 6-16  | 5                     | 1-2      |
| <i>C. caducus</i> Hirvenoja                                       | 1-14 | 7                     | 1-5      | 7-18  | 7                     | 1-5      |
| <i>C. coronatus</i> Hirvenoja                                     | 2-6  | 7                     | 1-2      | 2-5   | 7                     | 1        |
| <i>C. cylindraceus</i> (Kieff.)                                   | 4-10 | 5                     | 1-2      | 9-15  | 5                     | 1-2      |
| <i>C. festivellus</i> (Kieff.)                                    | 2-6  | 7                     | 1-2      | 2-8   | 7                     | 1-2      |
| <i>C. flavocinctus</i> (Kieff.)                                   | 2-4  | 5                     | 1-2      | 3-7   | 5                     | 1-2      |
| <i>C. magus</i> Hirvenoja                                         | 0    | —                     | —        | 3-5   | ?                     | 1-2      |
| <i>C. patens</i> Hirvenoja                                        | 1-5  | 7                     | 1        | 2-7   | 7                     | 1        |
| <i>C. pilosellus</i> Br.                                          | 0    | —                     | —        | 15-52 | 7                     | 1-2      |
| <i>C. polaris</i> Kieff.                                          | 0    | —                     | —        | 17-27 | 7                     | 1-2      |
| <i>C. tibialis</i> (Meig.)                                        | 0-5  | 7                     | 1-4      | 14-29 | ?                     | 1-4      |
| <i>C. triannulatus</i> (Macq.)                                    | 0-3  | ?                     | 1-2      | 6-10  | ?                     | 1-2      |
| <i>C. tristis</i> Hirvenoja                                       | 0    | —                     | —        | 8-12  | 5                     | 1-2      |
| <i>C. vierriensis</i> Goetgh.                                     | 0-6  | 7                     | 1-2      | 6-8   | 7                     | 1-2      |
| <i>C. (Isocladus) inter-</i><br><i>sectus</i> (Staeg.)            | 0    | —                     | —        | 6-17  | ?                     | 1-3      |
| <i>C. (I.) laricomalis</i> Edw.                                   | 0    | —                     | —        | 3-8   | ?                     | 1-3      |
| <i>C. (I.) obnixus</i> (Walk.)                                    | 0    | —                     | —        | 5-11  | 5                     | 1-3      |
| <i>C. (I.) ornatus</i> (Meig.)                                    | 0-4  | 7                     | 1-2      | 10-25 | 7                     | 1-3      |
| <i>C. (I.) perniger</i> (Zett.)                                   | 0    | —                     | —        | 2-5   | ?                     | 1-2      |
| <i>C. (I.) reversus</i> Hirvenoja                                 | 0    | —                     | —        | 4-15  | ?                     | 1-3      |
| <i>C. (I.) sylvestris</i> (Fabr.)                                 | 0-5  | 5                     | 1-2      | 15-30 | 5                     | 1-3      |
| <i>C. (I.) tricinctus</i> (Meig.)                                 | 0-1  | 5                     | 1-3      | 13-32 | 5                     | 1-3      |
| <i>Diplociadus cultriger</i> (Kieff.)                             | 0    | —                     | —        | 0     | —                     | —        |
| <i>Eukiefferiella devonica</i><br>(Edw.)                          | 0    | —                     | —        | 1-2   | 12                    | 2-3      |
| <i>E. minor</i> (Verr.)                                           | 0    | —                     | —        | 4     | 10                    | 2        |
| <i>Gymnometriocnemus volitans</i><br>Goetgh.                      | 0    | —                     | —        | 0     | —                     | —        |
| <i>Habrobaenus hudsoni</i> Saeth.                                 | 0    | —                     | —        | 0     | —                     | —        |
| <i>Halocladus</i> ( <i>Halocladus</i> )<br><i>fucicola</i> (Edw.) | 0-3  | ?                     | 1        | 4-7   | ?                     | 1-2      |
| <i>H. (H.) mediterraneus</i><br>Hirvenoja                         | 0    | —                     | —        | 3-9   | ?                     | 1-2      |
| <i>H. (H.) stagnorum</i> (Goetgh.)                                | 0-4  | ?                     | 1        | 6-13  | ?                     | 1-2      |
| <i>H. (H.) variabilis</i> (Staeg.)                                | 0    | —                     | —        | 6-16  | 10                    | 1-2      |
| <i>H. (H.) varians</i> (Staeg.)                                   | 0    | —                     | —        | 7-16  | ?                     | 1-2      |

|                                                                      | P <sub>2</sub> |                      |          | P <sub>3</sub> |                      |          |
|----------------------------------------------------------------------|----------------|----------------------|----------|----------------|----------------------|----------|
|                                                                      | N              | Length<br>( $\mu$ m) | Position | N              | Length<br>( $\mu$ m) | Position |
| <i>H. (Psammocladus) braunsi</i><br>(Goetgh.)                        | 0              | —                    | —        | ?-5            | ?                    | 1-2      |
| <i>Heterotanytarsus nudalus</i><br>Saether                           | 0-1            | ?                    | 2-3      | 1-2            | ?                    | 2-3      |
| <i>H. perennis</i> Saether                                           | 0              | —                    | —        | 1              | ?                    | ?        |
| <i>Heterotrissocladus changi</i><br>Saether                          | 0              | —                    | —        | 0-2            | ?                    | ?        |
| <i>H. cooki</i> Saether                                              | 0              | —                    | —        | 0              | —                    | —        |
| <i>H. grimshawi</i> (Edw.)                                           | 0              | —                    | —        | 0-2            | 14                   | 2        |
| <i>H. hirtapex</i> Saether                                           | 0              | —                    | —        | 0-2            | ?                    | ?        |
| <i>H. latilaminus</i> Saether                                        | 0              | —                    | —        | 0              | —                    | —        |
| <i>H. maeaei</i> Br.                                                 | 0              | —                    | —        | 0              | —                    | —        |
| <i>H. marcidus</i> (Walk.)                                           | 0              | —                    | —        | 0-1            | ?                    | ?        |
| <i>H. oliveri</i> Saether                                            | 0              | —                    | —        | 0              | —                    | —        |
| <i>H. scutellatus</i> (Goetgh.)                                      | 0              | —                    | —        | 0              | —                    | —        |
| <i>H. subpilosus</i> (Kieff.)                                        | 0              | —                    | —        | 0              | —                    | —        |
| <i>Hydrobaenus conformis</i> group<br>sensu Saether 1976             | 0              | —                    | —        | 2-10           | ?                    | ?        |
| <i>H. lapponicus</i> group sensu<br>Saether 1976                     | 0              | —                    | —        | 2-7            | ?                    | ?        |
| <i>H. lugubris</i> Fries                                             | 0              | —                    | —        | 7-14           | ?                    | ?        |
| <i>H. ? spinnatis</i> Saether                                        | 0              | —                    | —        | 12-14          | 8                    | 1-2      |
| <i>Limnophyes globifer</i> Lundstr.                                  | 2              | 10                   | 3-4      | 2              | 10                   | 3-4      |
| <i>L. hudsoni</i> Saether*                                           | 0-2            | ?                    | 4-5      | 0-2            | ?                    | 4-5      |
| <i>L. jemtilandicus</i> Br.                                          | 1              | 10                   | 3        | 1              | 10                   | 3        |
| <i>L. ? minimus</i> (Meig.)                                          | 2              | 10                   | 3-4      | 2              | 10                   | 3-4      |
| <i>L. prolongatus</i> Kieff.                                         | 0              | —                    | —        | 0              | —                    | —        |
| <i>L. pusillus</i> (Eat.) Edw.                                       | 0              | —                    | —        | 0              | —                    | —        |
| <i>Metriconepus</i> spp.                                             | 0              | —                    | —        | 0              | —                    | —        |
| <i>Mesocricotopus thienemanni</i><br>(Goetgh.)                       | 0              | —                    | —        | 0              | —                    | —        |
| <i>Nanocladus anderseni</i><br>Saether                               | 1-2            | ?                    | 1        | 0              | —                    | —        |
| <i>N. cf. bicolor</i> (Zett.)                                        | 4              | ?                    | 1-2      | 1              | ?                    | 1        |
| <i>N. minimus</i> Saether                                            | 1              | ?                    | 1        | 1              | ?                    | 3        |
| <i>Oliveria tricornis</i> (Oliver)                                   | 0              | —                    | —        | 1-2            | ?                    | 1-3      |
| <i>Orthocladus</i> (s.str.) ? <i>de-</i><br><i>coratus</i> (Holmgr.) | 5              | 5                    | 1        | 0              | —                    | —        |
| <i>O. (s.str.) ? excavatus</i> Br.                                   | 13             | 5                    | 1-2      | 5              | 5                    | 1        |
| <i>O. (Euorthocladus) frigidus</i><br>(Zett.)                        | 5              | 7                    | 1        | 13             | 7                    | 1-2      |
| <i>O. (Pogonocladus) con-</i><br><i>sobrinus</i> (Holmgr.)           | 6              | 7                    | 1        | 0              | —                    | —        |
| <i>Paracladus</i> cfr. <i>alpicola</i><br>(Zett.)                    | 0              | —                    | —        | 5              | 10                   | 1-2      |
| <i>P. conversus</i> (Walk)                                           | 0              | —                    | —        | 13-28          | ?                    | 1-2      |
| <i>P. quadrinodosus</i> Hirvenoja                                    | 0              | —                    | —        | 5-10           | ?                    | 1-2      |
| <i>Parakiefferiella nigra</i> Br.                                    | 0              | —                    | —        | 0              | —                    | —        |
| <i>Paratrachocladus rufiventris</i><br>(Meig.)                       | 0              | —                    | —        | 5              | 7                    | 1-2      |
| <i>P. skirwithensis</i> (Edw.)                                       | 0              | —                    | —        | 10-15          | 7                    | 1-2      |
| <i>Paratrissocladus excerptus</i><br>(Walk.)                         | 0              | —                    | —        | 1-2            | ?                    | ?        |
| <i>Trissocladus brevipalpis</i><br>Kieff.                            | 1-3            | ?                    | ?        | 9              | ?                    | 1-3      |
| <i>T. heterocerus</i> Kieff.                                         | ?              | ?                    | ?        | 3              | ?                    | ?        |
| <i>Zalutschia furcarca</i> Saether                                   | 0-2            | ?                    | ?        | 2-8            | ?                    | ?        |
| <i>Z. lingulata</i> Saether                                          | 0              | —                    | —        | 0-3            | ?                    | ?        |
| <i>Z. mucronata</i> (Br.)                                            | 0-2            | ?                    | ?        | 0-2            | ?                    | ?        |

|                                                | P <sub>2</sub> |                      |          | P <sub>3</sub> |                      |          |
|------------------------------------------------|----------------|----------------------|----------|----------------|----------------------|----------|
|                                                | N              | Length<br>( $\mu$ m) | Position | N              | Length<br>( $\mu$ m) | Position |
| <i>Z. iatrica</i> (Pagast)                     | 1-2            | 10                   | 1        | 1-5            | 10                   | 1        |
| <i>Psectrocladius limbatellus</i><br>(Holmgr.) | 4-5            | 5                    | 1        | 0              | —                    | —        |
| <i>Psectrocladius</i> sp. 1                    | 6              | 5                    | 1        | 0              | —                    | —        |
| <i>Psectrocladius</i> sp. 2                    | 16             | 5                    | 1-2      | 3              | 5                    | 1        |
| <i>Psectrocladius</i> sp. 3                    | 11             | 5                    | 1-2      | 0              | —                    | —        |
| <i>Smittia borealis</i> (Kieff.)               | 0              | —                    | —        | 0              | —                    | —        |
| <i>Smittia</i> sp. 1                           | 0              | —                    | —        | 0              | —                    | —        |
| <i>Smittia</i> sp. 2.                          | 0              | —                    | —        | 0              | —                    | —        |

• *L. hudsoni* 0-1 Sch in position 4-5 on P<sub>1</sub>

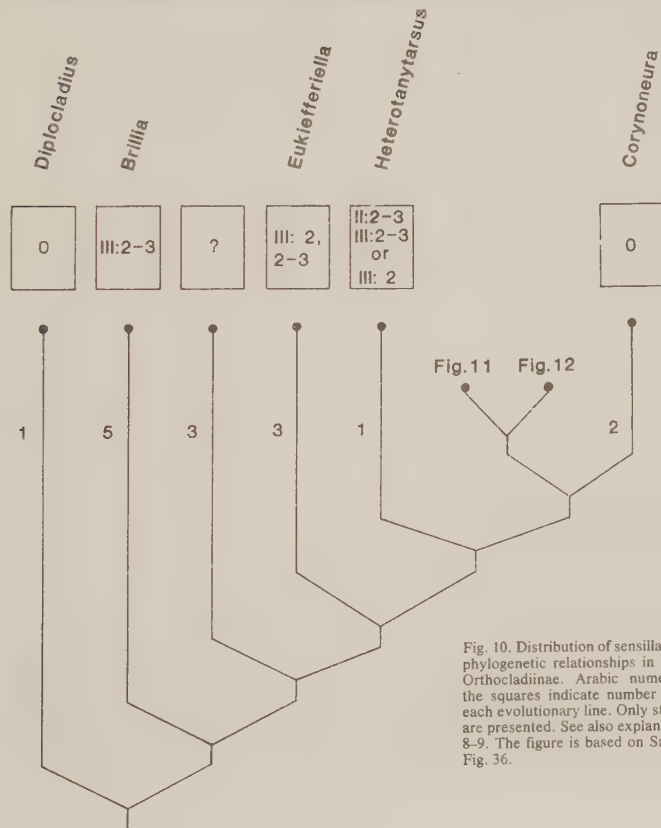


Fig. 10. Distribution of sensilla chaetica and phylogenetic relationships in a part of the Orthocladinae. Arabic numerals outside the squares indicate number of genera in each evolutionary line. Only studied genera are presented. See also explanation to Figs. 8-9. The figure is based on Saether 1977b: Fig. 36.

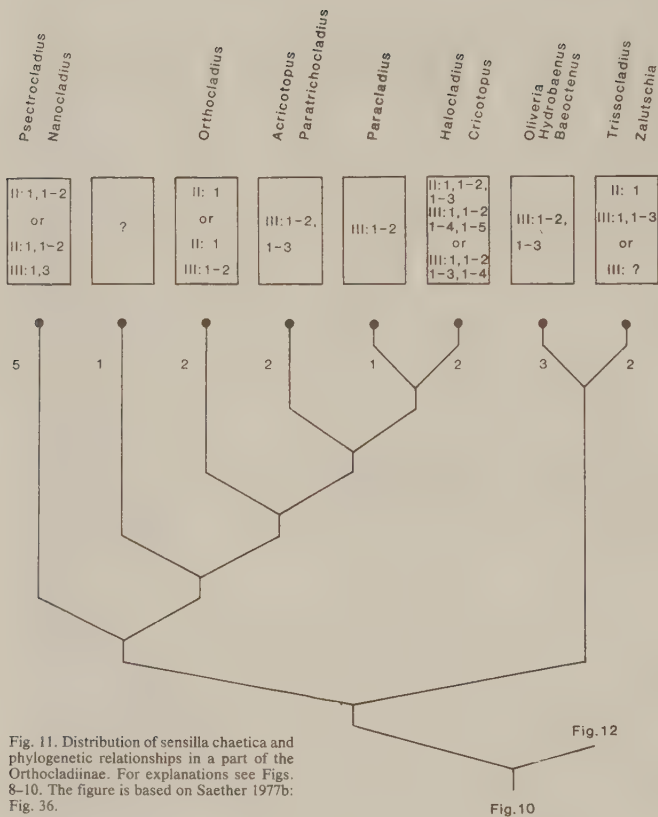


Fig. 11. Distribution of sensilla chaetica and phylogenetic relationships in a part of the Orthoclaadiinae. For explanations see Figs. 8-10. The figure is based on Saether 1977b: Fig. 36.

subfamily where SCHa have been found on  $ta_1$  of  $P_1$ , there is 0 or 1. The number of SCH is in most cases equal  $P_2$  and  $P_3$  or  $P_3$  possesses a higher number. In the genera *Nanocladius*, *Orthocladus* and *Psectrocladius* there are species with more SCH on  $P_2$  than on  $P_3$ . The highest numbers of SCH are found among species in the *Cricotopus* series. The length of the SCH varies between 5 and 19  $\mu m$ .

The position of SCH on  $ta_1$  of  $P_1$  is 0 or 1. On  $ta_1$  of  $P_2$  and  $P_3$  they are found in positions 1, 1-2, 1-5, 1-4, 1-3, 2-3, 3, 3-4 or 4-5. The species *Nanocladius minimus* differs from all other Orthoclaadiinae species in having the SCH in different positions between  $P_2$  and  $P_3$ .

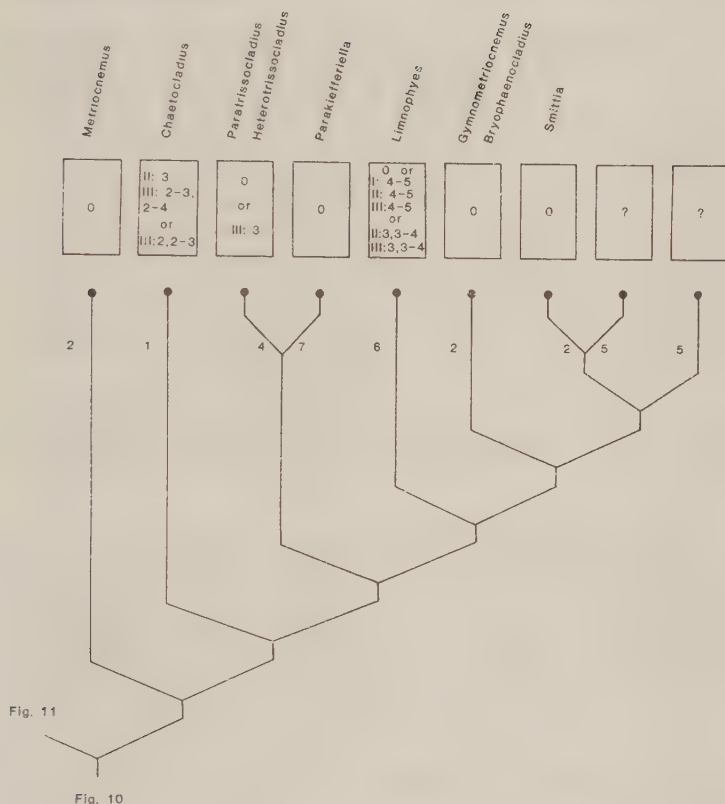


Fig. 12. Distribution of sensilla chaetica and phylogenetic relationships in a part of the Orthoclaadiinae. For explanations see Figs. 8-10. The figure is based on Saether 1977b: Fig. 36.

### Subfamily Chironominae

This subfamily consists of three tribes. A study of the phylogenetic relationships at the generic level is presented by Saether (1977b).

### Tribe Tanytarsini

Representatives belonging to 16 genera have been studied (Tab. 6., Fig. 13). In all these the SCh are confined to  $ta_1$  of  $P_2$ . In five species,



Table 6. Number, length and position of sensilla chaetica on  $ta_2$  of  $P_2$  in Tanytarsini.

|                                                             | N     | Length<br>( $\mu$ m) | Position |
|-------------------------------------------------------------|-------|----------------------|----------|
| <i>Camposia echinata</i> Reiss                              | 0     | —                    | —        |
| <i>Corynocera ambigua</i> (Zett.)                           | 10    | 7                    | 3-5      |
| <i>Cladotanytarsus</i> sp.                                  | 3     | ?                    | 5        |
| <i>Lauterbornia coracina</i><br>(Zett.)                     | 8     | 12                   | 4-5      |
| <i>Micropsectra apposita</i><br>(Walk.)                     | 5-7   | 22                   | 5        |
| <i>M. borealis</i> (Kieff.)                                 | 2-3   | 12                   | 5        |
| <i>M. contracta</i> Reiss                                   | 4-11  | ?                    | 5        |
| <i>M. insignilobus</i> Kieff.                               | 2-4   | 22                   | 5        |
| <i>M. junci</i> (Meig.)                                     | 4-8   | 17                   | 5        |
| <i>M. lindebergi</i> Sæw.                                   | 2-3   | 22                   | 5        |
| <i>M. lindrothi</i> Sæw.                                    | 6-20  | 15                   | 5        |
| <i>M. notescens</i> (Walk.)                                 | 4-9   | 22                   | 5        |
| <i>M. tori</i> Sæw.                                         | 0     | —                    | —        |
| <i>Neozavrelia fuldensis</i><br>Fittkau                     | 0     | —                    | —        |
| <i>Nimbocera patagonica</i><br>Reiss                        | 15-20 | 9                    | 3-5      |
| <i>Parapsectra uliginosa</i><br>Reiss                       | 16    | ?                    | 2-5      |
| <i>Paratanytarsus abisko-</i><br><i>ensis</i> Reiss & Sæwæd | 2     | 19                   | 5        |
| <i>P. austriacus</i> Kieff.                                 | 12    | 14                   | 5        |
| <i>P. hyperboreus</i> Br.                                   | 5     | 20                   | 5        |
| <i>P. ? inopertus</i> (Walk.)                               | 6     | 22                   | 5        |
| <i>P. laccophilus</i> Edw.                                  | 5     | 17                   | 5        |
| <i>P. natvigi</i> (Goetgh.)                                 | 6     | 16                   | 5        |
| <i>P. tenellulus</i> (Goetgh.)                              | 4-6   | 14                   | 5        |
| <i>Pontomyia natans</i> Edw.                                | 0     | —                    | —        |
| <i>Rheotanytarsus</i><br><i>lamellatus</i> Reiss            | 2     | ?                    | 5        |
| <i>R. globosus</i> Reiss                                    | 8     | 19                   | 5        |
| <i>Stempellina almi</i> Br.                                 | 1     | ?                    | 5        |
| <i>S. bausei</i> (Kieff.)                                   | 1     | ?                    | 5        |
| <i>Stempellinella minor</i> Edw.                            | 0     | —                    | —        |
| <i>Tanytarsus brundini</i><br>Lindeb.                       | 4     | 16                   | 5        |
| <i>T. clivus</i> Reiss.                                     | 1-2   | 22                   | 5        |
| <i>T. decipiens</i> Lindeb.                                 | 3     | 19                   | 5        |
| <i>T. dispar</i> Lindeb.                                    | 4     | 19                   | 5        |
| <i>T. fastigatus</i> Reiss                                  | 2     | 22                   | 5        |
| <i>T. gracilentus</i> Holmgr.                               | 8     | 10                   | 5        |
| <i>T. gregarius</i> (Kieff.)                                | 5     | 19                   | 5        |
| <i>T. hamatus</i> Reiss                                     | 2-3   | 22                   | 5        |
| <i>T. lestagei</i> Goetgh.                                  | 5     | 16                   | 5        |
| <i>T. ligulatus</i> Reiss                                   | 4-5   | ?                    | 5        |
| <i>T. palmeri</i> Lindeb.                                   | 5     | 19                   | 5        |
| <i>T. paralogulatus</i> Reiss                               | 5-7   | 13                   | 5        |
| <i>T. rinhuensis</i> Reiss                                  | 4-5   | 17                   | 5        |
| <i>T. simulans</i> Lindeb.                                  | 4     | 17                   | 5        |
| <i>T. socialis</i> Lindeb.                                  | 6     | 16                   | 5        |
| <i>T. tuberculatus</i> Reiss                                | 4-5   | 17                   | 5        |
| <i>Zavrelia pentatoma</i> Kieff.                            | 0     | —                    | —        |

*Camposia echinata* Reiss, *Neozavrelia fuldensis* Fittkau, *Pontomyia natans* Edw., *Stempellinella minor* Edw. and *Zavrelia pentatoma* Kieffer, the SCh are lacking. The latter four are small species and *C. echinata* of medium size. A loss of a character or a simplification of it has in many instances been shown to be correlated with a decrease in size.

The position of the SCh varies between 2-5, 3-5, 4-5 and 5. This means that they have a general apical position. The most common positions are 4-5 and 5. It should be noted that the species *Corynocera ambigua* (Zett.), *Nimbocera patagonica* Reiss and *Parapsectra uliginosa* Reiss in which the SCh are distributed over the larger part of the tarsomere (3-5, 3-5 and 2-5, respectively) are species with reduced wings and which copulate on a substrate.

The length of the SCh varies between 7 and 22  $\mu$ m. It is interesting to note that *C. ambigua* and *N. patagonica* have markedly shorter SCh than the rest of the studied species. *P. uliginosa* has not been measured.

The number of SCh varies between 0 and 20.

#### Tribe Pseudochironomini

Species belonging to five genera have been studied (Tab. 7., Fig. 13). In three of them, *Aedocritus* sp., *Manoa obscura* Fittkau and *Megacentron cuneicalcar* (Edw.), SCh are completely lacking. *Pseudochironomus prasinatus* (Staeg.) and *P. truncatocaudatus* Edw. have SCh on  $P_2$  and  $P_3$ . They are 16 to 23  $\mu$ m long and found in positions 1 and 2 on  $P_2$  and in positions 1 and 1-2 on  $P_3$ . In one species, *Riethia stictoptera* Kieffer, the SCh are confined to  $P_3$  where they are found on the basal part.

#### Tribe Chironomini

SCh are confined to  $P_2$  in 20 of the studied genera (Tab. 8., Figs. 14-16). SCh on  $P_2$  and  $P_3$  are found in representatives of 14 genera. The latter are widely dispersed throughout the Chironomini system and we often find that they, sometimes together with other not studied genera, are in a sister-group relationship to each other. In all species possessing SCh on both  $P_2$  and  $P_3$  the number of SCh is slightly to considerably higher on  $P_2$  than on  $P_3$ . Another interesting fact is that the examined *Chironomus* (*Camp-*

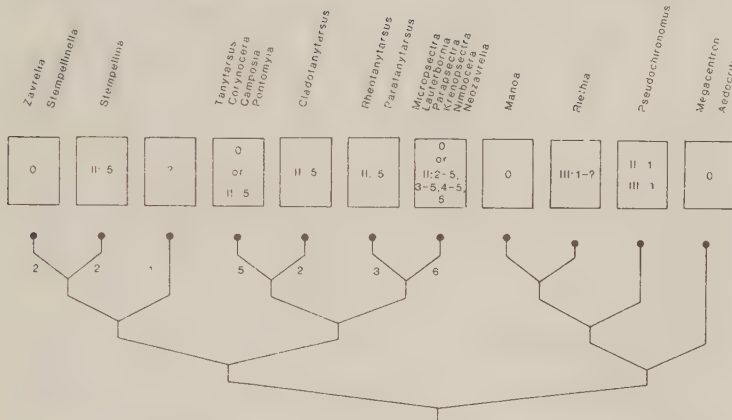


Fig. 13. Distribution of sensilla chaetica and phylogenetic relationships in the tribes Tanytarsini and Pseudochironomini. For explanations see Figs. 8–10. The figure is based on Sæther 1977b: Fig. 62.

*tochironomus*) and *Glyptotendipes* species lack SCH on P<sub>3</sub>. This is contrary to the condition found in *Chironomus* (s.str.) where the species have SCH also on P<sub>3</sub>.

The number of SCH on ta<sub>1</sub> of P<sub>2</sub> varies between 0 and 47 and on ta<sub>1</sub> of P<sub>3</sub> between 0 and 44. The length varies between 11 and 28 µm on P<sub>2</sub> and between 12 and 26 µm on P<sub>3</sub>.

The position of the SCH on the tarsomere is

3–4, 4, 2–5, 3–5, 4–5 and 5. On ta<sub>1</sub> of P<sub>2</sub> the position varies more. The SCH are found in positions 2, 2–3, 2–4, 2–5, 3–5, 4–5 and 5.

There is no clear trend in the distribution of SCH on ta<sub>1</sub> within the Chironomini. The only indication of a trend is that the genera *Paratendipes* and *Microtendipes* have the SCH in positions 2 and 2–3, respectively. The other genera have the SCH in a slightly more distal position.

Table 7. Number, length and position of sensilla chaetica on ta<sub>1</sub> of P<sub>2</sub> and P<sub>3</sub> in Pseudochironomini. Species with length of sensilla chaetica indicated with a ? = species not studied by me. The table is based on own material and on data presented by Sæther (1977a).

|                                             | P <sub>2</sub> |             |          | P <sub>3</sub> |             |          |
|---------------------------------------------|----------------|-------------|----------|----------------|-------------|----------|
|                                             | N              | Length (µm) | Position | N              | Length (µm) | Position |
| Tribe Pseudochironomini                     |                |             |          |                |             |          |
| <i>Aedocrilus</i> sp.                       | 0              | —           | —        | 0              | —           | —        |
| <i>Manoa obscura</i> Fittkau                | 0              | —           | —        | 0              | —           | —        |
| <i>Megacentron cuneicalcar</i> (Edw.)       | 0              | —           | —        | 0              | —           | —        |
| <i>Pseudochironomus prasinatus</i> (Staeg.) | 5–7            | 16          | 1        | 5–8            | 16          | 1        |
| <i>P. truncatocaudatus</i> Edw.             | 1              | 23          | 2        | 7              | 23          | 1–2      |
| <i>Riethia stictoptera</i> Kieff.           | 0              | —           | —        | 7              | ?           | 1–?      |

Table 8. Number, length and position of sensilla chaetica on  $ta_1$  of  $P_2$  and in Chironomini.

|                                             | $P_2$ |                       |          | $P_3$ |                       |          |
|---------------------------------------------|-------|-----------------------|----------|-------|-----------------------|----------|
|                                             | N     | Length<br>( $\mu m$ ) | Position | N     | Length<br>( $\mu m$ ) | Position |
| <i>Baeotendipes</i> sp.                     | 11    | 13                    | 3-5      | 10    | 13                    | 3-5      |
| <i>Beckidia tethys</i><br>(Townes)          | 1     | 15                    | 5        | 0     | —                     | —        |
| <i>Campiochironomus tentans</i> (Fabr.)     | 24    | 14                    | 4-5      | 0     | —                     | —        |
| <i>Chernovskii orbicus</i> (Townes)         | 4-7   | 18                    | 5        | 0     | —                     | —        |
| <i>Chironomus</i> sp.                       | 23    | 17                    | 3-5      | 16    | 17                    | 4-5      |
| <i>Chironomus</i> sp.                       | 17    | 12                    | 4-5      | 17    | 12                    | 4-5      |
| <i>Chironomus</i> sp.                       | 17    | 17                    | 4-5      | 14    | 19                    | 4-5      |
| <i>Cladopelma viridula</i> (Fabr.)          | 7     | 11                    | 4-5      | 0     | —                     | —        |
| <i>Cryptochironomus</i> sp.                 | 5     | 22                    | 4-5      | 3     | 26                    | 4-5      |
| <i>Cryptotendipes pilicuspis</i> Saether    | 7     | ?                     | 3-5      | 0     | —                     | —        |
| <i>Cyphomella cornea</i> Saether            | 4     | ?                     | 3-5      | 0     | —                     | —        |
| <i>C. gibbera</i> Saether                   | 4     | ?                     | 3-5      | 0     | —                     | —        |
| <i>Demetjerea rufipes</i> (L.)              | 30    | 16                    | 2-5      | 0     | —                     | —        |
| <i>Demicrochironomus vulneratus</i> (Zett.) | 11    | 23                    | 3-5      | 5     | 23                    | 5        |
| <i>Dicrotendipes lobiger</i> (Kieff.)       | 4     | 18                    | 5        | 0     | —                     | —        |
| <i>D. nervosus</i> (Staeg.)                 | 6     | 15                    | 4-5      | 0     | —                     | —        |
| <i>Einfeldia dissidens</i> (Walk.)          | 8     | 16                    | 4-5      | 7     | 16                    | 4-5      |
| <i>Endochironomus impar</i> (Walk.)         | 8-13  | 22                    | 5        | 5-9   | 22                    | 5        |
| <i>Endochironomus</i> sp.                   | 28    | 25                    | 2-4      | 5     | 25                    | 4        |
| <i>Flouria lacustris</i> Kieff.             | 47    | 10                    | 2-5      | 39    | 10                    | 2-5      |
| <i>Goeldichironomus amazonicus</i> (Fittk.) | 11    | 20                    | 4-5      | 9     | 20                    | 4-5      |
| <i>G. holoprasinus</i> (Goeldi)             | 4     | 18                    | 3-5      | 0     | —                     | —        |
| <i>Glyptotendipes</i> sp.                   | 21    | 22                    | 3-5      | 0     | —                     | —        |
| <i>Glyptotendipes</i> sp.                   | 16    | 23                    | 3-5      | 0     | —                     | —        |
| <i>Harnischia fuscimana</i> (Kieff.)        | 6     | 20                    | 4-5      | 2     | 20                    | 4-5      |
| <i>Kiefferulus tendipediformis</i> Goetgh.  | 47    | 18                    | 2-5      | 44    | 18                    | 2-5      |
| <i>Microchironomus deribae</i> (Freem.)     | 11    | 10                    | 3-5      | 0     | —                     | —        |
| <i>Microtendipes brevitaris</i> Brundin     | 26    | 20                    | 2-3      | 0     | —                     | —        |
| <i>M. chloris</i> Kieff.                    | 8-16  | 20                    | 2-3      | 0     | —                     | —        |
| <i>Nilodorum brevibucca</i> Kieff.          | 19    | 18                    | 3-5      | 7     | 18                    | 4-5      |
| <i>Parachironomus arcuatus</i> Goetgh.      | 14    | 13                    | 4-5      | 0     | —                     | —        |
| <i>P. frequens</i> (Joh.)                   | 18    | ?                     | 3-5      | 0     | —                     | —        |
| <i>P. siljanensis</i> Brundin               | 30    | ?                     | 3-5      | 0     | —                     | —        |
| <i>Paracladopelma obscura</i> Brundin       | 2     | 23                    | 5        | 0     | —                     | —        |
| <i>Paratendipes albanus</i> (Meig.)         | 2-4   | 20                    | 2        | 0     | —                     | —        |
| <i>Phaenopsectra flavipes</i> (Meig.)       | 2     | 28                    | 5        | 0     | —                     | —        |
| <i>Polypedilum nubeculosum</i> (Meig.)      | 4     | 16                    | 5        | 0     | —                     | —        |
| <i>Polypedilum</i> sp. 1                    | 0     | —                     | —        | 0     | —                     | —        |
| <i>Polypedilum</i> sp. 2                    | 0     | —                     | —        | 0     | —                     | —        |
| <i>Polypedilum</i> sp. 3                    | 0     | —                     | —        | 0     | —                     | —        |
| <i>Robackia claviger</i> (Townes)           | 1-2   | ?                     | 5        | 0-2   | ?                     | 5        |
| <i>R. pilicauda</i> Saether                 | 0     | —                     | —        | 0     | —                     | —        |
| <i>Sergentia coracina</i> (Zett.)           | 2     | 12                    | 5        | 0     | —                     | —        |
| <i>Stictochironomus histrio</i> (Fabr.)     | 2-4   | 10                    | 5        | 0     | —                     | —        |
| <i>S. rosenschoeldi</i> (Zett.)             | 3-4   | 19                    | 5        | 0     | —                     | —        |
| <i>Tribelos</i> sp.                         | 8     | 23                    | 5        | 6     | 23                    | 5        |
| <i>Xenochironomus xenolabis</i> Kieff.      | 30    | 19                    | 3-5      | 5     | 19                    | 3-4      |
| <i>Zavreliella</i> sp.                      | 12    | 18                    | 4-5      | 5     | 19                    | 3-4      |

## Discussion

Sensilla chaetica are present in many groups of insects but the type of leg Sch where the apical

portion is split up into about 8 tips seems to be unique for the Chironomidae (cf. the section "General results").

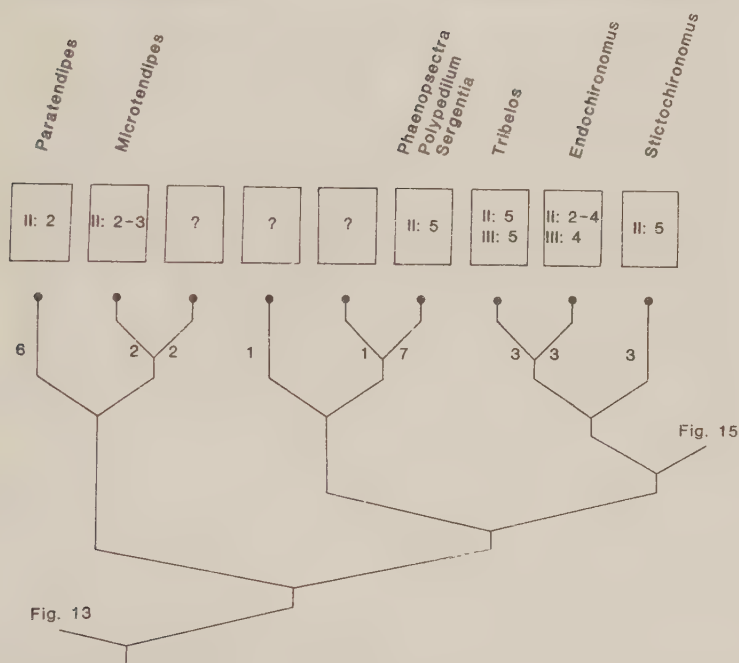


Fig. 14. Distribution of sensilla chaetica and phylogenetic relationships in a part of the tribe Chironomini. For explanations see Figs. 8-10. The figure is based on Saether 1977b: Fig. 62.

The presence of this particular type in the Telmatogetoninae, Tanypodinae, Podonominae, Diamesinae, Prodiamesinae, Orthoclaudiinae and Chironominae may constitute a synapomorphy for the Chironomidae. Their possible absence in Aphroteniinae and Buchonomyinae may be due to reduction. The general distributional patterns of SCH fit well with the phylogeny presented by Saether (1977b) and Brundin & Saether (1978). Cf. Fig. 17.

The graphic presentation of my results (Figs. 8-17) are based on the cladograms presented by Brundin (1966), Saether (1977b), Brundin & Saether (1978) and Serra-Tosio (1968). The results

agree to a large extent with those reached by the former two authors, while they differ from those reached by Serra-Tosio.

I have found two trends in the distribution of the SCH:

1. The ancestor of the Chironomidae most probably had SCH on  $P_2$  only. During the evolution SCH also developed on  $P_3$  in some taxa. In some of the latter the SCH on  $P_2$  were reduced.
2. The position of the SCH tends to move from a basal position on tarsomere I towards a more apical position during the evolution. This trend occurs in a number of evolutionary

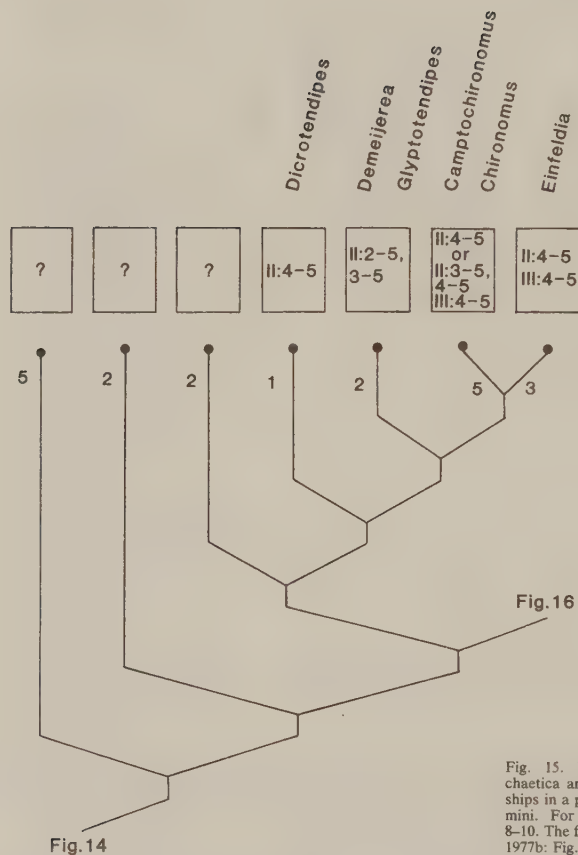


Fig. 15. Distribution of sensilla chaetica and phylogenetic relationships in a part of the tribe Chironomini. For explanations see Figs. 8-10. The figure is based on Saether 1977b: Fig. 62.

lines. The presence of these parallelisms restricts the phylogenetic use of this trend to taxa already delimited by synapomorphies. The details of these trends are discussed below.

The distribution of SCH between the different pairs of legs shows a clear pattern (Fig. 17). They

are found on  $P_2$  in Telmatogetoninae, Tanypodinae, Podonominae, Diamesinae, Orthocladiinae and Chironominae. SCH also on or only on  $P_3$  and in one case on  $P_1$  are found in Diamesinae, Prodiamesinae, Orthocladiinae and Chironominae. This distributional pattern indicates that the ancestor of the Chironomidae possessed SCH

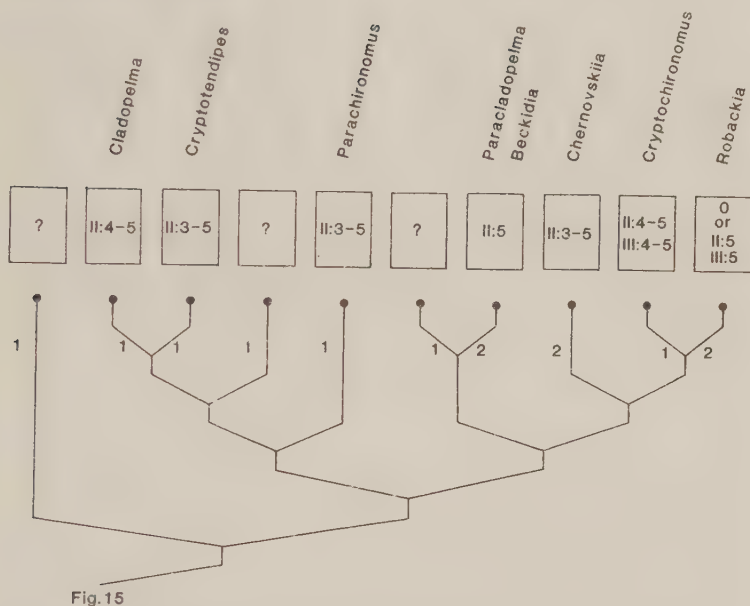


Fig. 16. Distribution of sensilla chaetica and phylogenetic relationships in a part of the tribe Chironomini. For explanations see Figs. 8-10. The figure is based on Saether 1977b: Fig. 62.

only on  $P_2$ . SCH on  $P_2$  is the plesiomorph character state. There are one or several evolutionary lines within the subfamilies Diamesinae, Orthocladiinae and Chironominae, along which we can follow the development from taxa with SCH on  $P_2$  towards taxa with SCH on  $P_3$  and  $P_2$  or only on  $P_3$ . In one Orthocladiinae species, *Limnophyes hudsoni* Saether, there are SCH on all pairs of legs. The Diamesinae and Prodiamesinae (Tabs. 2-4, Figs. 8, 17) have the apomorphic character state. The Orthocladiinae (Tab. 5., Figs. 10-12) shows a more mixed picture than the other subfamilies. This probably is due to the fact that the phylogenetical relationships within this subfamily are not fully cleared. The fact that my graphic presentation is based on figures contain-

ing these uncertainties may account for this mixed pattern. The majority of studied Orthocladiinae taxa have SCH on  $P_3$ . SCH are sometimes found only on  $P_3$  but in most cases both on  $P_3$  and  $P_2$ . The subfamily as a whole seems to be more apomorphic in this character than the Chironominae. A possible trend is that many Orthocladiinae taxa tend to lose the SCH during the evolution (Figs. 10-12). The evolution of the Chironominae (Tabs. 6-8, Figs. 13-16) follows two lines. One leads to the tribes Pseudochironomini and Tanytarsini (Fig. 13). In this line two of the studied species, *Pseudochironomus prasinatus* and *P. truncatocaudatus*, have SCH on  $P_2$  and  $P_3$  while the species *Riethtia stictoptera* has SCH only on  $P_3$ . The other three Pseudochiro-



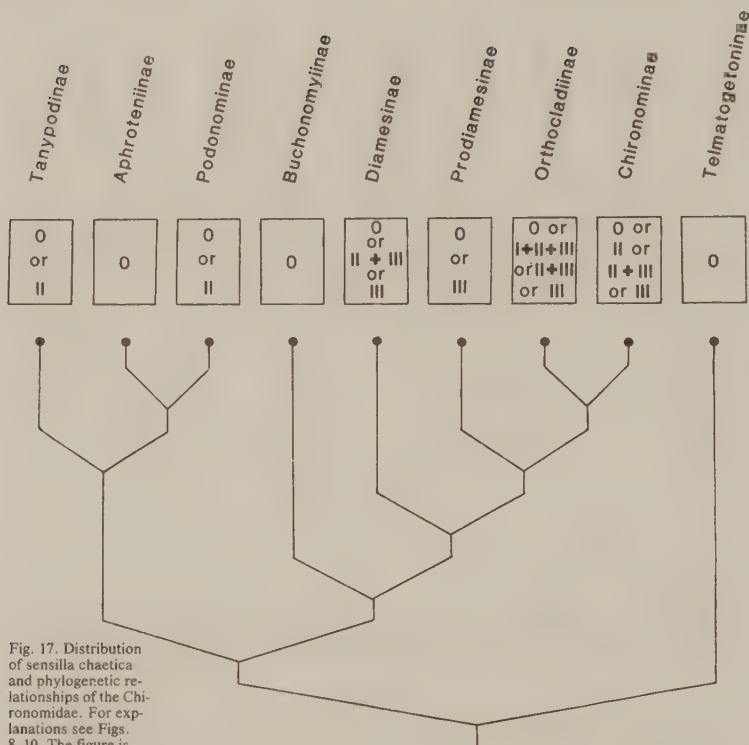


Fig. 17. Distribution of sensilla chaetica and phylogenetic relationships of the Chironomidae. For explanations see Figs. 8–10. The figure is based on Saether 1977b: Fig. 16 and Brundin & Saether 1978: Fig. 4.

nomini species studied lack SCH. The Tanytarasini have no SCH on  $P_3$ . In the other line, the Chironomini (Figs. 14–16), most taxa have SCH only on  $P_2$ . In 14 of the studied genera SCH are present on both  $P_2$  and  $P_3$ . As mentioned above these taxa often display interesting patterns of sister-group relationships.

The position of SCH on tarsomere 1 displays patterns that are of phylogenetical importance.

The general tendency within the individual evolutionary lines seems to be that the SCH moves from position 1 towards position 5. In species having SCH on more than one pair of legs the position is nearly always in the same interval on the different pairs except in the single species *Nanocladius minimus* Saether (Saether 1977a: 21) where the positions differs considerably. In Fig. 9 where the phylogeny of the Diamesini is

depicted according to Serra-Tosio (1968: plate XII) it appears as though the evolutionary trend is from position 5 towards position 1. However, in all other evolutionary lines it is evident that the trend is in the opposite direction. Since an evolutionary direction from position 1 towards position 5 is in good agreement with the well founded cladograms presented by Saether (1977b) for the subfamilies Orthoclaadiinae and Chironominae I believe that Fig. 9 does not show the true nature of the phylogenetical relationships between the Diamesini genera. Furthermore, it is unlikely that there are two trends with exactly the opposite directions in taxa so closely related as Diamesini, Orthoclaadiinae and Chironominae. A direction of the trends from 1 towards 5 would also explain the fact that Protonypini have the Sch in position 1 (cf. Fig. 9).

The position and number of Sch have been used in anagenetic and phylogenetic discussions on the *Cricotopus* series (Hirvenoja 1973) and for the genera *Paratrissocladius* Zavrel, *Hydrobaenus* Fries, *Trissocladius* Kieffer, *Zalutschia* Lipina and *Oliveridia* Saether (Saether 1976). Hirvenoja (1973: 53) used the following trend with three steps in his anagenetic discussion: "21. Sch on all legs of ♀, on P<sub>2</sub> and P<sub>3</sub> of ♂ (1), on P<sub>2</sub> and P<sub>3</sub> of ♂ and ♀ or when present also on P<sub>1</sub> of ♀, then only on P<sub>3</sub> of male (2) or by ♀ also on P<sub>2</sub> and P<sub>3</sub> and by ♂ only on P<sub>3</sub> (3)". Hirvenoja treats the ♂ and ♀ as one unit. Since it is not known whether or not the two sexes are influenced by exactly the same environmental factors I find it principally important to study the two sexes separately in the same way as for the pupal and larval stages. The different developmental stages have often been shown to have reached different morphogenetical levels. Application of this principle to trend 21 of Hirvenoja gives the following result for the ♂♂: Sch on P<sub>2</sub> and P<sub>3</sub> (1), Sch on P<sub>2</sub> and P<sub>3</sub> or Sch on P<sub>3</sub> (2), Sch on P<sub>3</sub> (3). From this scheme it is evident that there are only two steps: Sch on P<sub>2</sub> and P<sub>3</sub> (1) and Sch on P<sub>3</sub> (2). In the cladogenesis Hirvenoja (1973: 65) used the following trend: "13. ♂ with Sch at most on the proximal one half of Ta<sub>1</sub> of P<sub>3</sub> (a) or they are more widely distributed (p)". Saether (1976: 21, 25-27) used the following trends: "30. Sch present on P<sub>2</sub> in male and female (1), absent on P<sub>2</sub> in both sexes (2). 31. Sch in male 5 or more, in female 15 or more (1); less than 5 in male, less than 15 in female (2). 41.

Sch usually absent on P<sub>2</sub> of male (a), usually present (p). 62c. Sch on Ta<sub>1</sub> of P<sub>3</sub> less than 5 in male, less than 15 in female (a). Higher numbers (p). 69. Sch <5 on Ta<sub>1</sub> of P<sub>3</sub> of male (a), >5 (p). 79. Sch absent on p<sub>2</sub> in both sexes (a), usually present on p<sub>2</sub> in both sexes (p)". Also Saether combines males and females in his trends but in this case the males and females seem to coincide.

Both authors assume that the presence of Sch on P<sub>2</sub> is a plesiomorphy and that consequently, their absence is an apomorphy. My results show that Sch only on P<sub>2</sub> is the plesiomorphic character state in Chironomidae. Sch also on or only on P<sub>3</sub> is the apomorphic state of character. In many taxa the Sch are reduced and this could also be regarded as an apomorphy. Since my opinion is that reductions are too frequently used in phylogenetical discussions and the evidences presented by them often dubious, I have avoided to use them.

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